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KNOWLEDGE AND USE OF NATIVE TREES BY LOCAL FOREST USERS:
IMPLICATIONS FOR A PHILIPPINE PROTECTED AREA

By

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B.A., Bowdoin College, Brunswick, Maine, 1999

Thesis

presented in partial fulfillment of the requirements

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This thesis examines the forest knowledge of non-indigenous, local forest users in the Northwest Panay Protected Area located on the island of Panay in Central Philippines, and the opportunities and constraints to integrating this knowledge into local conservation efforts. The research is based on participant observation, interviews, and sketch maps involving eleven key forest users and interviews with representatives from the three local conservation organizations. Local forest knowledge is discussed through three themes: geographic or area knowledge (GAK), forest ecology knowledge (FEK), and tree species-specific knowledge (TSK). Tree species-specific knowledge, particularly knowledge of seeds and germplasm transfer, was the component local forest users had the most working knowledge. Nevertheless, local conservation organizations do not seek and use local forest knowledge, or share information and resources with local forest users generally. The thesis concludes with recommendations for how local conservation organizations could utilize local seed and tree specific knowledge and practices in conservation efforts.

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1. INTRODUCTION

An experiment is happening in the Philippines. After decades of centralized, government led forest planning and management, windows have opened allowing the participation of local forest peoples and communities within protected forest area management.

Decentralized forest planning and management have led to more controls on commercial logging, and more responsibilities for forest management to local authorities (Utting 2000). Opinions regarding devolution range from commending it for allowing more equitable and efficient use of resources (Nygren 2005), to criticizing it as insufficiently understanding site-specific complexity (Songorwa 2004). Others are fearful that it will exacerbate conflicts between different forest users and potential managers (Dressler et al., 2006). In either case, there has been little respect for and use of knowledge of local forest users in park planning and management.

There are many reasons for limited attention to local forest knowledge in protected area management. For one, many consider exploitation of resources by local people as a key driver of forest degradation, along with rapid population growth and commercial logging (During 1992; Ehrlich 1988). Another is that biologists tend to prioritize non-human species and the biological science they have developed around their survival and conservation (Janzen 1986). Global conservation organizations define conservation priority areas based on endangered or threatened non-human species (Herlihy and Knapp 2003). Their approach known as bioregionalism also tends to focus on very large-scale landscapes and habitats (Brosius 2004).

Nonetheless, over the last two decades there have been efforts to address the interests of those who live and work within forests, in the Philippines and elsewhere (Utting 2000). Anthropologists have documented local peoples' understanding of ecological dynamics and forest management practices that maintain habitat and encourage biodiversity (Brosius 1990, Posey 1992, Turner et al., 2003). A new field of "traditional ecological knowledge" has developed (Berkes et al., 2000), based on the notion that local people have developed site-specific knowledge that has enabled them to live with and use forest resources, often for centuries (Becker and Leon 2000). Advocates of traditional ecological knowledge suggest that understanding how local people conceptualize and use particular parcels of forest, including the different forest species and resources within them, have much to offer conservation (Berkes et al., 2000). However, it is often not clear which local people possess forest knowledge, how local knowledge can be verified (especially when it conflicts with other types of knowledge claims), and how different knowledge claims are part of larger projects that support competing interests. This is especially challenging in situations involving local people and global conservation initiatives (During 1992).

With this background in mind, the questions that drive this research are:

- Do forest users have knowledge that could be integrated into forest planning?
- How do outsiders study and document what forest users "know"?
- How do you identify and learn with "key" forest users?
- What are the political constraints to their acceptance as "partners" in a more participatory and decentralized forest management regime?

- What lessons can be offered to move forward with incorporating local knowledge holders into forest management?

This thesis is organized in six chapters. Chapter two reviews the literature on local knowledge. This section pays particular attention to debates regarding who is “local” and what constitutes “knowledge.” Attention to these debates are particularly important when one considers that many forests and protected areas involve “local” forest users who are not native or indigenous to that area but recent migrants, and their forest use is supplemental to both their culture and livelihood. The section also includes attention to how to study local knowledge and, the ways it can potentially be used to enhance forest users’ participation in forest conservation efforts. Here I review the literature that considers how the geographic, cultural and political marginalization of local forest users creates obstacles for them to be considered “partners” in conservation. Finally, the review turns to the specific context of the Philippines to suggest how the debates on local knowledge are playing out in this country.

Chapter three describes my research methodology, including the theoretical framework, field techniques, and sampling strategies I used. Here, I introduce my research site in the Northwest Panay Protected Area on the island of Panay in Central Philippines. I conclude the section with a discussion on the strengths and limitations of my research approach.

Chapter four presents the first of two results chapters and addresses the key results of my field research with key forest users regarding their local knowledge. These are summarized under three themes: (1) categories of forest knowledge, (2) knowledge of tree seeds and wildlings and (3) sharing and use of forest knowledge. The first theme

involves geographic and place-specific aspects of forest knowledge. The second theme describes how a sub-sample of my key forest users understood germplasm knowledge and used it to manage seeds and trees. The third theme addresses how forest users would like this information to be used with conservation organizations working in the area.

Chapter five turns to conservation in the Northwest Panay Protected Area. It discusses the different conservation organizations in the study site, and their conservation strategies and approaches. This chapter focuses on the differences in forest management strategies between local conservation organizations and local forest users, and the opportunities and constraints to incorporating local forest users and their knowledge into conservation efforts. This chapter highlights the lack of communication and respect for each other between the two groups, and the greater power and influence of the conservation organizations to identify and institute conservation strategies for the area.

Chapter six presents my recommendations for cautiously moving forward with devolved managed, with both site specific recommendations and a discussion that recommends strategies and methods for integrating aspects of local knowledge with programs and priorities of conservation organizations. I recommend specific activities that can build on local forest users' knowledge and potential labor contributions into forest management on Panay Island – activities that I suggest have benefits for each group. Despite the differences that separate conservation organizations and local forest users, I conclude that there are specific activities that can facilitate devolution and community-based forest management in the Panay region, and which can contribute to the larger experiment with forest devolution in the country more broadly.

2. LITERATURE REVIEW

This chapter reviews the literature on local knowledge and the issues related to its use in forest management and conservation efforts. I define local knowledge and review how it has been used to understand and improve forest management efforts, especially where local forest users have not had secure access and control of forest resources as well as the authority to influence forest conservation and management strategies. Finally, I discuss forest management efforts in the Philippines and on the island of Panay in light of questions regarding local forest knowledge.

2.1 Origins of Local Knowledge

Ways of knowing, or perceiving the environment, have been understood in various ways. As Berkes et al. (2000) note in their review of traditional knowledge, Levi-Straus describes two distinct ways of perceiving the physical world, one which is concrete, the other abstract (see Levi-Strauss, 1962). Feyerabend (1987) differentiates between abstract traditions which fall into scientific ecology and historical traditions. Others believe that there are no fundamental differences between traditional and scientific ways of knowing because they both inevitably begin with experiential knowledge (see Agrawal, 1995).

In the context of natural resource management, ‘local knowledge’ may be defined as involving a group of people who live and work within a particular environment and possess intricate understanding of the natural world in which they live. Who are “local” people? What are the differences between different types of “local people?” Where does their knowledge come from? Why should conservationists care about “local knowledge?”

Local knowledge involves understanding gained from lived experience rather than western scientific processes of generating knowledge. Brosius (2004) describes the sources and quality of this information as:

peasants, farmers, fishers, or indigenous peoples, often living in out-of-the-way places, frequently marginalized politically and economically. These are the people we most often turn to when we seek to elicit local knowledge, people we have come to valorize as possessing richly detailed knowledge representing generations of observation and experimentation; about medicinal plants, crop varieties, trees, the habits of animals, and much more (4).

These assumptions guide the way questions are asked and answered. In recent years, the disciplines of ethnobotany, ethnozoology, and taxonomy have all contributed to local knowledge has been formed and answered. Connections between local knowledge, biodiversity conservation, and practices of forest management that maintain habitat and biodiversity make a case for valuing the perspectives of local people (see Brosius, 1990; Gadgil et al., 1993; Posey, 1992; Turner, et al., 2003). Some of this work assesses local knowledge in light of management tensions (see Peluso, 2005); other work acknowledges the link between local knowledge and natural resource management (Joshi et al., 2004). Research in tropical agroforestry systems has long acknowledged the complexity of such local knowledge (see Conklin, 1954; Hanson, 1991). Central to this work is the assumption that indigenous and/or local people:

“possess, in their ecological knowledge, an asset of incalculable value: a map to the biological diversity of the earth on which all life depends. Encoded in indigenous languages, customs, and practices may be as much understanding of nature as is stored in the libraries of modern science.” (Alan Durning, as quoted by Brosius, 2004).

2.1.1 Differentiating among local, indigenous, and traditional

Different authors use different terms to describe local knowledge and local knowledge holders. Some authors, for example, use the words ‘traditional’ (see Ford & Martinez, 2000; Berkes et al., 2000) or ‘indigenous’ (Sillitoe, 1998) to described this knowledge . This can be problematic because many indigenous people maintain multiple identities or respond to the changing cultural politics of identity and the media (see Offen, 2003; Joshi et al., 2004). Hirtz (2003), in his discussion of the challenges of indigenous recognition, refers to a web of legal systems, NGOs, and local government rules that brings groups closer to being developed as they negotiate the challenges of formal indigenous recognition by institutions.

Rather than deciding which groups make an indigenous or traditional cut, knowledge is often cultivated from multiple sources. The term “indigenous” or “native” does not always allow for these dynamic associations (Warren, 1995). Despite this, we are still left with questions about who are local knowledge holders and who does or does not have local knowledge?

In the world of conservation funding and priorities, this is particularly important for forest and indigenous peoples. In the Philippines, land claims in Protected Areas often are made on whether groups are counted as *indigenous* (Hirtz, 2003). Furthermore, local ecological knowledge is diverse and of varying quality across geographic areas (Joshi et al., 2004). The presence of forest migrants, wage labor opportunities, and western world views all affect the quality and quantity of local knowledge.

2.1.2 Defining Local Knowledge

Because of these complexities, many authors use the term local knowledge, or local environmental knowledge (sometimes referred to as LEK). Others use the term traditional ecological knowledge, or TEK (see Dewalt, 1999; Folke, 2004; Gadgil et al., 1999; Lasserre & Ruddle, 1983; Posey, 1992). Most authors agree that a definition of TEK includes culturally transmitted knowledge and beliefs that concerns the relationship of living beings that are an integral part of their environment. For the purposes of this thesis, local knowledge will concern information relevant to forest management within my study site.

As others note (Becker & Leon, 2000; Brosius & Russell, 2003; Gadgil et al., 1998), it is important to distinguish the stereotypes of what we see as *indigenous* and the specific environmental knowledge we are seeking: knowledge within a geographic boundary such as a particular forest or protected area by local people who are familiar with their environment.

2.1.3 Representing Local Knowledge

Berkes (1999) presents a useful framework for conceptualizing how knowledge is related to resource management systems. The interlinked “knowledge-practice-belief-system complex” based on the scales of local knowledge, land and resource management systems, social institutions, and world view are pictured in Figure 1.

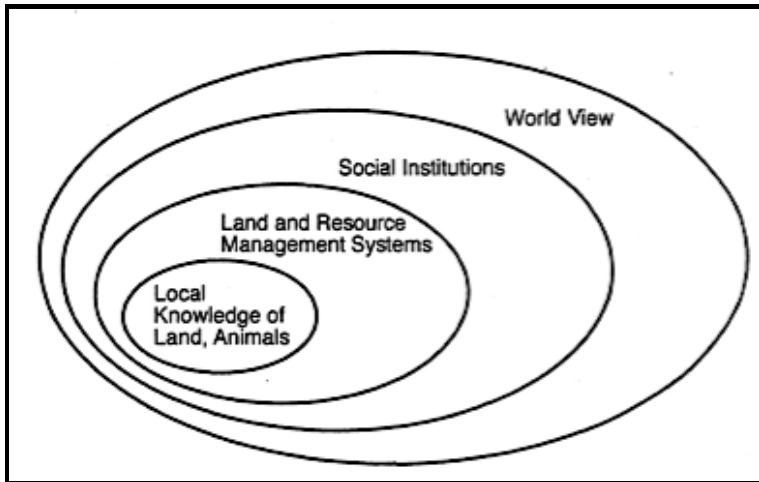


Figure 1 – Knowledge-Practice-Belief-Complex (Berkes 1999: 261)

Within this framework, multiple sources of knowledge, beliefs and practices interact. The focus of this thesis is on the center category of Berkes diagram above—local knowledge of land, animals. While it is importantly embedded and tied to broader resource management systems and social institutions, I focus on this narrower category, but keep in mind throughout how local knowledge of land, animals and especially plants and trees, are embedded in this broader, integrated complex.

I focus on this inner circle because this may be viewed as a beginning or entry point to understanding the complex of traditional ecological knowledge. It is also the arena where forest users, especially forest migrants or short-term residents, are likely to have the most experience; their relative newness to an area suggests they lack generations of living in a place necessary for developing complex resource management customs and institutions.

2.1.4 Methods of Documenting Local Knowledge

By definition, local knowledge is context specific. Methods of describing local knowledge are often qualitative and involve long-term observations and active

participation of local people within the research. Furthermore, data collection may not involve traditional sampling methods as local knowledge is not randomly spread through a population. Documenting local knowledge has been especially important in areas where traditions of customary use (Moller et al., 2004) and property rights (King and Eyzaguirre, 1999) are contested; another reason why using standard scientific research and sampling methods may be difficult.

Other studies compare farming and upland management practices across cultural and local scales to determine best management practices (Tengo and Belfrage, 2004).

Mapping at varying scales is a helpful technique to understand both local knowledge and outcomes of knowledge (Roth, 2004). Table 1 summarizes a list of select themes documented in local knowledge research.

Table 1 – Selected Ecological Practices and Mechanisms in local knowledge (adapted from (Berkes et al., 2000). Other sources as noted in table.

Management practices
Practices found in conventional resource management/local/traditional societies
Monitoring resource abundance and change
Total protection of a species
Protection of vulnerable life history stages
Protection of specific habitats
Temporary harvest restrictions
Practices largely abandoned but still found in some local/traditional societies
Multiple species management; maintaining ecosystem structure and function
Resource rotation
Succession management
Creation of forest gaps without disrupting natural renewal (Ramakrishnan, 1992; Turner et al., 2003)
Practices related to the dynamics of complex systems, seldom found in conventional resource management
Nurturing sources of ecosystem renewal

2.1.5 Emergent Categories of Local Knowledge

From Table 1, several categories of local forest knowledge may be developed.

Monitoring resource abundance and change, rotation of resources, protection of specific habitats, and creation of forest gaps to mimic the surrounding forest involve detailed geographic knowledge of a forest area. Many of these concepts also involve site specific knowledge (ie. soils, climate, and vegetation).

Other ideas surrounding local knowledge are specifically related to trees. These include succession management and the creation of forest gaps. Consequently, the ideas of geography, forest ecology, and tree specific knowledge may be used to help categorize the framework of local knowledge described above by Berkes et al. (2000).

2.1.6 Local Knowledge within Ecological Systems

Components of local knowledge described in Table 1 are gathered from forests that have working and living histories that are known by local people; these are places where people are actively living. Tropical forests throughout the world primarily involve a history of human intervention (Kleinman et al., 1995). These forests are where the majority of the world's poorest people still work and live. These are places where forest communities are living, developing livelihoods, and agroforestry systems throughout the tropics (Cronon 1990). In such places, communities are living and developing ecologically sustainable livelihood and agroforestry systems (Poffenburg 1990, Dove

1990). In other communities, where local knowledge is at risk, in decline, or hard to locate, important information can also be learned.

In the Philippines, there has been extensive work documenting swidden or shifting cultivation systems. Research documenting the sustainability of swidden agriculture has challenged scientific norms and provided insight to both sustainable agriculture and systems such as swidden which involve long time periods (see Conklin, 1957; Kleinman et al., 1995). This work is an important contribution to the field of traditional knowledge as described by Berkes because of its extreme detail and understanding of the interconnections across knowledge of land, animals and plants with community resource management institutions and world view.

Understanding local knowledge and resource systems within the broader landscape is particularly important, and necessitates further understanding local history, politics, culture and markets. Forest management that does not have a full understanding of the people and system it seeks to change can contribute to conversion of forest to non-forest lands (Oates, 1995). Consequently, research that documents local knowledge and addresses how local vs. macro views of forests and forest use are extremely important.

2.1.7 Challenges Investigating Local Knowledge

As Conklin notes, forest users are not a homogenous category – some are long term with intricate local knowledge and resource management systems while others are short-term forest cultivators and users with more limited familiarity with the ecosystems in which live and work. Nonetheless, the latter may still have important knowledge. Clearly they have knowledge about trees and places important to them. They also may have

knowledge of trees and other resources in short supply and of particular value to them and they may offer important information regarding their ecology, use, and market demands (Chambers, 1994). Paying attention to what local people do and know can provide important information (see Brosius, 2004; Hirtz, 2003) and become an important rationale for their involvement in broader resource management efforts (Utting, 2000). Over time, this is resulting in better understanding of the complexity of local knowledge as suggested in Berkes “knowledge-practice-belief system complex” (see Figure 1).

2.1.8 Who has Knowledge? What quality is it?

Tropical conservation efforts have acknowledged multiple ways of knowing by involving local people in various participatory conservation approaches. The outcomes of these projects have varied substantially (see Hughes and Flintan, 2001; Newmark & Hough, 2000). In part, this is because the source of local knowledge and institutional support, and participation of outside actors has varied substantially.

Concerning the dissonance of competing knowledge in Kalimantan, Indonesia, Jefferson Fox writes: “Farmers and foresters are little prepared by their experience to understand problems, goals, perspectives of the other side (Fox, 1990:119).” In cases, where local and non-local knowledge is exchanged to discuss management issues, the process of information exchange must be open and trusted. As Reid (2000) notes, information is salient if particular groups value it and who might use it to change management approaches, behavior, or policy decisions, and if the process of assembling the information is perceived to be fair and open to others such as from the private sector, governments, and civil society.

This type of participatory approach moves beyond including local people merely as “beneficiaries” to one that more fully involves them in assessing and using knowledge to make management decisions (Wily, 2002).

There is a long history of local people not being credited with knowing about their agriculture and resource management practices, and not being given a meaningful role in the development and conservation of them. This is most acute with swidden agriculture. Swidden involves seasonally based stages of forest clearing, cropping, and fallow. Many refer to it as “slash and burn” and treat it as a wasteful, destructive, and inefficient form of agriculture (Dove, 1983; Kleinman et al., 1995; Van den Top, 2003). For example, Gourou (1956), quoted in Brosius (1990:80) states that it “hinders the rational management of agriculture land... [it]invests nothing in the soil and this inevitably results in low yields...the system is [provides] an inadequate economic basis on which a high civilization may achieve great political and intellectual attainments.” In full-page advertisements by the national logging company in the Philippines, forest disappearance is linked to “slash-and-burn farmers, settlers, and illegal loggers who indiscriminately cut the trees (Pagdanan as quoted by Broad, 1993).” These farmers have long been considered important contributors to the problem of tropical deforestation (Dove, 1983; Dubios, 1996; Geollegue, 2000; Myers, 1991).

However, the problem of swidden agriculture has more to do with observers not understanding the critical differences among these cultivators. Harold Conklin studied swidden groups in the Philippines and is one of the early studies that challenge dominant views of swidden agriculture. Conklin provided detailed description of Hanunóo

swidden agriculture (1953). Later he made the important distinction between *integral* swidden cultivators who have been in a place for generations and practice short cultivation - long fallow rotations and their swidden systems are part of a broader resource management system, as compared to *partial* cultivators (Conklin 1957). Partial or migrant cultivators involve farmers who maintain strong sociocultural ties outside the immediate swidden area into which they bring permanent-field agriculture concepts. They often are less familiar with methods, ecosystem processes, and consequences, while integral swiddenists understood and use them well. Subsequent observers fail to make these important distinctions, erroneously grouping them all as “slash and burn” cultivators and disregarding the complex traditional ecological knowledge of integral swiddenists.

Other studies also document traditional ecological knowledge, and the ability of groups to adapt to changing conditions. Moran (1979) documents intercropping methods, ecosystem mimicry, canopy structure, and soil protection techniques of swiddenists. Studies of Mangyan swidden systems shows local peoples’ ability to adapt to exotics and the scarcity of fallow land by shifting crop production and recognizing “farming subsystems” (Nijhof, 1997).

The above review suggests the necessity to make distinctions between long term and more recent migrant farmers or forest users. Berkes’ model of traditional knowledge systems illustrates the nested, interconnectedness of a knowledge system. People who have lived within a forest or used its resources for a shorter time are not as likely to have as strongly interconnected or independent social systems, or a world view as part of a distinct knowledge system. Van den Top’s work with forest migrants in the Sierra Madre

in the northern Philippines showed that fallow systems practiced exclusively by forest migrants are not the same as Conklin's description of complex fallow systems.

Opportunities to cultivate and maintain knowledge are very different for forest users who do not have access to land, labor and capital. In some of these scenarios however, forest migrants were found to cultivate native corn, upland rice, and avoid the use of petrochemical inputs in swidden plots (Van den Top, 2003). So even if more short term or migrant forest users and cultivators do not have the same depth of complex traditional knowledge systems or resource management capabilities, their knowledge and forest use could still be useful to resource management and conservation efforts. Unfortunately there is little research on this question (Van den Top, 2003).

Outside of swidden plots, within forest patches, and national parks, assessing local knowledge and how it applies to resource management can still be very complex. This is not only because of the nuances of ecological systems and properties, but also because of the likelihood of more recent forest users lacking secure property and territorial rights, especially in the eyes of more powerful state and non-state conservation actors (Vihemaki, 2005). In these situation, local forest users may not even be seen as legitimate forest users; perhaps not surprising is that they are not considered to possess knowledge or skills that could be useful to conservation by non-local actors. This is described in Figure 2 and discussed in the next section.

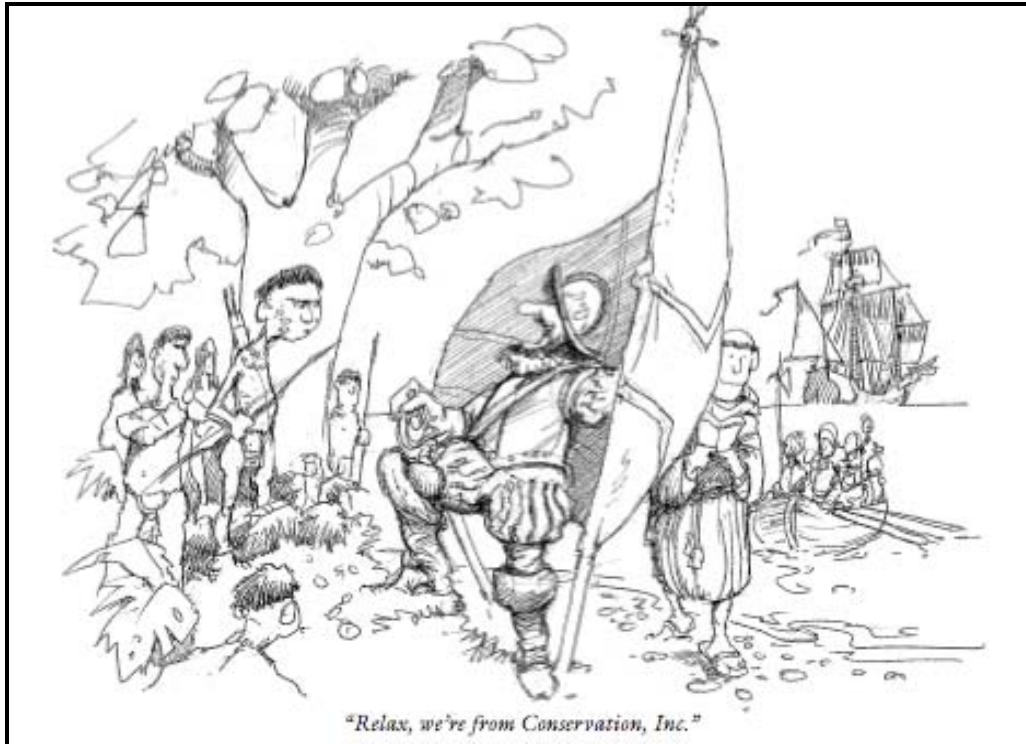


Figure 2 – The confrontation of locals and outsiders (from Chapin, 2004:23).

2.2 Approaches to Forest Management in the Philippines

A review of Philippine upland and forest management policies and strategies is a necessary context to understand how local knowledge is evoked in Philippine discourses and practices. It is particularly relevant to understand how upland and forest management have been dominated by: (1) expert-led policies and interventions and (2) a limited political space for contributions of local knowledge to management. A rethinking of these policies has local and global implications for conservation and management. This section begins with a historical overview of forest policy in the Philippines and follows with a description of contemporary issues facing local people relying on forest resources.

2.3 Historical Overview of Forest Control and Management

Formal control of Philippine forests first occurred with the arrival of Magellan on the island of Luzon in 1521. Magellan claimed the entire archipelago for the Spanish crown, establishing a precedent for state territorial authority. The legal effect of this, according to Lynch (1984), was to convert the entire unexplored archipelago into squatters. Under Spanish colonial laws, land was Spanish owned unless documentation that recognized community property rights was acquired by local people. This policy continued until 1985 as the basic land law in the Philippines: undocumented land was considered by the government to be state owned regardless of whether it was occupied or cultivated. This policy has created a litany of land disputes between forest communities and the state.

Forest land disputes have followed a cycle of local resistance, state repression, and the clearing of forest lands. The loss of communal associations with land commons in medieval Spanish law and Filipino custom are closely correlated with clearing of forestlands and the commercialization of agriculture. To encourage sedentary populations and enforce village (*barrio*) and district units (*sitio*), the production of wet rice was encouraged and the beginning of industrial agriculture in the Philippines was born in the mid seventeen-hundreds. This marked the beginning of the large-scale subjugation of forest communities and their movement from upland forests to lowland areas. As lowland areas became increasingly developed, land clearing pushed into the uplands; a few groups moved deeper into forests to avoid Spanish subjugation (Roth 1977). This first wave of forest clearing fueled demands for forests products, provided fuel for a large sugar cane refining industry, and created the first forest migrants in the Philippines. The largest sugar mills and plantation companies, many on the same land,

still operate today continuing the practice of employing forest migrants.

By 1870, many islands in the Philippines were completely denuded. As a result, the first Philippine Forest Bureau, a government agency that later became the Department of Environment and Natural Resources, banned logging on the island of Cebu in 1863. This practice created lively black markets in timber (Roth 1983), which also persist today. In 1900, the first American was appointed director of the forest bureau. While staff development and conservation measures were emphasized, the isolation of the Manila office, red tape, and bureaucratic policies often delayed legitimate timber use. In 1905, one American forest bureau employee claimed that if there were to be a revolution in the Philippines, it would be the forest bureau's fault (Poffenberger 1990:9). Within the forest bureau, conflict between values of extraction and forest conservation was strong (Roth 1983).

The advent of steam-powered logging in 1904 accelerated the extraction of hardwoods and led to widespread clearing cutting. Access for lowland migrants was opened as roads were developed. Despite the role of commercial logging, deforestation and upland degradation were officially attributed to population growth and the spread of shifting cultivation (Poffenberger 1990). As noted above, to this day official discourse continues to discount claims of small-scale, upland farmers, and research demonstrating the diversity and sustainability of swidden practices (Dove 1983, Brosius 1990).

Periods of American and Japanese occupation continued the trends of land clearing and minimizing local forest access. The United States supported industrial agriculture through large-scale land clearing operations while the Japanese occupation from 1941 to

1945 forced communities further into forests and on to steeper slopes for cultivation. As a response to this, legislative acts between 1966 and 1975 undermined tenure claims of local people. Groups of hunters, swidden cultivators, and migrant farmers continued to be branded by state and development officials as “slash and burn encroachers” or “backward tribals” (Poffenberger 1990:20). Meanwhile, the expansion of sugar cane and coconut lands in the lowland Visayan Islands encouraged resource extraction and impacted ancestral domains of both indigenous people and people living proximate to forests (Broad and Cavanagh 1993).

In the late 1970s and 1980s, large-scale logging concessions were granted to raise revenues for the state (Poffenberger 1990). President Marcos created a system of cronyism by awarding political associates with timber leases (Broad and Cavanagh 1993), and possibly inflating estimates of forest cover (Kummer 1991, 2003).

Conflict arose over these logging policies leading to insurgency and violence. Over time and with the change of administrations, these conflicts have resulted in greater recognition of forest users and their settlements. One example of this is the development of certificate of stewardship contracts (CSCs) and community forest leases (CFL); these have served to strengthen tenure security of both forest-based families and communities (Poffenberger 1990). Despite this more inclusive policy, certificates and contracts were only issued on 0.2 percent of public forestland between 1974 and 1981 (DENR 1993). As Lynch (2005) notes, one result of this policy is that the Philippines has some of the highest proportions of non-landowning farm families—some 25 to 35 percent—in the world.

By 1997, the Philippine Government claimed ownership to nearly 60 percent of all lands, almost half of which is formally classified as “public” forest or is unclassified and legally presumed to be forested. This claim has benefited elites involved in large-scale logging and exploitation of forest resources. This reached a head when Ferdinand Marcos declared martial law in 1972 and sometimes brutal displacement of forest communities occurred (Lynch 2005). Since this time, timber concessions have steadily decreased along with remaining primary forest. Resistance, in the form of rural-based rebel groups has grown while more people—stuck within state forests -- remain invisible, not counted as landholders or displaced from their original lands.

2.3.1 Rise of Social Forestry

Rural resistance helped fuel change and support for the 1982 Integrated Social Forestry program. Under this initiative, teams were given authority to demarcate public lands for the issue of lease agreements. The Uplands Working Group of the Philippines, which advised this program, concluded that tenure arrangements needed to address the following: (1) make tenure arrangements compatible with diverse traditions and practice in the uplands, (2) decentralize and empower local institutions, and (3) provide a social forest strategy which addresses the needs of upland people (Broad and Cavanagh 1993). Local forest users were also granted rights to access land for subsistence use, generally in the form of 25 and 30-year renewable community-based forest management (CBFM) leases. However, lease terms—especially requirements for forest protection and the planting of certain species, can be quite restrictive (Li 1999). While local people may have a tentative foothold on lands, lists of activities, species planted, and lines on CBFM

permit maps are all signed and documented by the DENR and the leaser (Broad and Cavanagh 1993). These agreements represent a distinction between different types of forest users—both indigenous communities and lowland holders. Although this is an attempt to ensure that forest health is protected, on the ground permits are issued to individuals regardless of plans or site condition. Since land is not usually inspected, permits are issued to forest users with varying knowledge and priorities. Local knowledge of these forest users has been not well documented in many parts of the Philippines outside of Conklin and other's cited above.

2.3.2 Forest Conflict between the State, Conservation Organizations, and Local People

In the Philippines and elsewhere in Southeast Asia, the demand for foreign exchange was a primary driving force for government support of large-scale logging. By 1978, Southeast Asia provided nearly two-thirds of global hardwood production (Poffenberger 1990). With timber revenues primarily limited to taxes and royalties, profits were only obtainable through large scales of extraction. Copper, gold, and marble mining industries were offered incentives to extract maximum resources at minimum cost (Poffenberger 1990). These practices continue today. High profit margins and continued extraction has caused forestry agencies to deny attention to communities within and adjacent to forests.

With the loss of small-scale mills and market links to forest products in areas of industrial logging, many forest communities throughout the region are at risk. Forest “holdouts” that the state typically labels as insurgents continue to serve as bases and sources of resistance in the Philippines. Other than increased non-governmental initiatives to act on the behalf of indigenous people, the government does not necessarily make clear

distinctions between indigenous and non-indigenous forest communities.

As the evolution of forest management and conservation areas in the Philippines continues, there has been an emphasis on the role of local participation, science, defining problems, and seeking resolution. Utiing (2000), in his discussion on the development of participatory conservation in the Philippines, makes the point that solutions need to be context specific, supportive of institutions at all levels, and have social and political coalitions that can mobilize support and action for conservation work. Despite this call to action and the work of The Ford Foundation and others, decisions by the DENR are still primarily top down. Research reports and lobbying by NGOs continue to place biodiversity protection on local agendas, but often priorities are dictated by the history described above.

The island of Panay is a very good place to study forest management in the Philippines because new institutions have specifically been created to mobilize support for forest conservation efforts on local and non-local levels. At the same time, a National Protected Area was established in 2002 in the Northwest corner of Panay Island. Since the world's first national park was established in the United States in 1872, management of protected areas and nature reserves have mostly been in conflict with local residents (Colchester 1996) who, particularly in the south, continue to bear substantial costs because of their proximity to these reserves while often gaining little in return. The long-term objectives of these reserves are largely in conflict with the immediate needs or demands of local communities. Imposed protected areas have had a number of negative consequences, including the restriction of access to traditionally-used resources, the disruption of local peoples and economies by tourists and forced relocation of local peoples from traditional

lands (Colchester 1996, Lusigi 1984, Mishra 1984). The environmental consequences to the alienation created by this classical approach to conservation can be serious (Walpole et al 1993). Progressive initiatives in the Philippines have mitigated this aspect of conservation policy by requiring the participation of local stakeholders (tenured migrants, indigenous peoples, settled communities, local government, NGOs) during the implementation of, and planning for, protected area management (NIPAS Act of 1992). However, these participatory conservation programs have had a limited effect on these progressive policies of co-management (Utting 2000). In order to establish guidelines worthy of this co-management, it is necessary to understand how local people can contribute or fit into this management puzzle.

2.4 Conservation Hotspots and Protected Areas

Industrial logging, the marginalization of communities, and problems with participation of local people in forest management create a need to document local knowledge and how it is integrated into forest conservation efforts. Figuring this out is a project that requires cognizance of an international conservation agenda.

Work in the late 1990s initiated by Conservation International (CI), World Wildlife Fund for Nature (WWF), and The Nature Conservancy (TNC), mapped global hotspots based on criteria of biodiversity and identified threats. Conservation International (CI) describes The Philippines as one of the ‘hottest of “hotspots” containing ‘thousands’ of species found ‘nowhere else in the world’, and hence, ‘a scientific treasure house worthy of international attention (1997:2).’ As a result, the nation is one of only two to be entirely identified as a conservation hotspot.

When discussing the island of Panay and in the Philippines, researchers often claim sites as a “hotspot within a hotspot (Oliver and Heany 1997). Support for conservation institutions on the island of Panay comes largely from western or European-based organizations (pers. observation).

While this outside support has provided funding for many initiatives, this has also meant that concerns of local communities are consequentially voiced primarily by outsiders. Information from local communities, filtered through organizations working at local levels creates what Bryant (2002) and others term “imagined communities.” As a result, maps identifying hotspot areas are devoid of specific people and places and have little on-the-ground meaning for forest management. This emphasis on scientific forestry, or conservation biology, often directs research and creates tension in forests and lowland communities. Adding to this tension is that park rangers have been given mandates to patrol the forests and protection biodiversity, sometimes with guns (Gauld 2000, pers. observations).

As a response to mapping efforts and forest patrols, both critics and communities call for mapping locally important resources using local terms and reflecting local priorities (see Herlihy, 2003; Offen, 2003; Peluso, 1995; Sirait et al., 1994).

2.4.1 Mapping of Forests

With the hotspot initiative and mapping of bioregions, much work in the Philippines has involved the production of GIS layered maps for national parks. As local communities have gained access to these maps, there has been significant emphasis on remapping areas to document land claim and resources important to communities. Local

communities have often opposed large-scale mapping efforts because activities are often done without their involvement. All the forest users in my study were aware of multiple forest mapping activities but none of the forest users I worked with had ever seen any of these maps. Critics of these mapping activities note that scientists and mapmakers cannot document complex forest management strategies or alternative forms of land use (Sirait et al., 1994). Examples in the Philippines include local people establishing tree nurseries or cooperatively managing land. Other mapping critics (e.g. Peluso, 1995) remind us that mapping is inherently political. Maps can increase state control of spaces and unrest and valuable resources (Menzies 1992); consolidate control across forest boundaries (Girod and Nietschmann, 1993); and zone fragile, steep, or biologically diverse areas (Peluso 1995).

When community leaders have been more directly involved in processes of mapping, or have engaged in mapping processes of their own to “counter-map” claims by outsiders (see Peluso 1995), vastly different maps are created. In Nicaragua, where community leaders and intellectuals were involved in the mapping processes, exercises resulted in redefining lands to be used for community members and activities (Offen, 2003). In the Philippines, issues of expert-led mapping exercises have involved farmers in the interpretation of satellite photographs to construct a “jointly understood” world (Gonzalez, 2002). Despite these innovative methods, mapping emphasizes the dichotomy between the map makers and those who are to be mapped. As a result, Clapp (2004) calls for remapping conservation territories to acknowledge differences to avoid putting forest users and conservation actors at odds. Maps that document local knowledge are crucial to this process. This remapping, as discussed in the methods

section, needs to be done with care.

This remapping comes at a time in the Philippines when some are beginning to be receptive to local knowledge systems. Sam Koffa, an implementer of a European Union forestry programs in the Philippines, with reference to work in Northwest Panay, explained :

“The strategy of transnationals—to implement projects and outline conservation areas based on particular types and ways of knowledge is old. The question now-- should be-- how do people see forest conservation? Environments? Areas within forests? It is only after understanding these perspectives we can intervene—and work together (pers. comm.).”

2.4.2 Local Knowledge, Community Forests, and Trees

One reason for this call to action and attention to local knowledge are the complex ecological systems in the Philippines. In between the defined endpoints of primary forest and rice fields, forest land and uses defy easy categorization (Kummer 2003). These lands include natural forest, plantation forest, pasture, permanent and non-permanent agriculture, fallow fields and fuel wood production. In these areas, utilizing local forest names and categories might be particularly useful to conservation efforts.

Among these lands, thousands of people have planted trees for commercial and home wood markets, covering tens of thousands of hectares (Bensel 1995; Kummer et al. 1994). People in rural communities plant, replant, retain, and protect trees on farms, ranches, and in lowland and upland agricultural areas to benefit both products (fodder, food, fruit, firewood, timber, poles, waxes, etc.) and services (soil fertility, watershed stability, shade, carbon sequestration, boundary delineations, greenbelts, etc.) that forests provide (see Peters 1989; ICRAF 2001; Arnold 1995). Growing evidence suggests that

there are more trees in these agroforest systems than in some primary forests (FAO 1997; FAO 1995). Incorporating trees into agroforestry landscapes under particular conditions can increase off-farm income and food security. However, there is a lack of information on incorporating trees into forest farming systems on the island of Panay (Koffa 2003).

The value of native species is particularly important because the history of state-based reforestation efforts focus on exotic species (Condono 2005). The benefits to growing native tree species are not often appreciated, and include: adaptation to local growing conditions, acceptance by local people, uses based on local knowledge, cultural significance, maintenance of biodiversity, and additional products and markets (Butterfield 1994). Local people across the Philippines have expressed interest in cultivating high-value indigenous species. Constraints to this include lack of germplasm, knowledge surrounding propagation and management, and slow growth rates and problematic policies (DENR 1993).

2.4.3 Germplasm, Trees and Seeds as part of local knowledge

Germplasm, most notably in the form of seeds, might be the single most important input in forest farming systems (Koffa 2003). Outside of the formal state supply system (where exotic seeds and seedlings are readily available), informal seed supply systems often operate within and between communities (Cromwell et al., 1992). Understanding how, why, and where forest users collect, transfer, and plant seeds has relevance to both forest users and conservation scientists. This suggests that research approaches and conservation strategies that incorporate local knowledge can be an important way to integrate local and non-local management agendas and approaches.

In one study, expert seed collectors in Mindanao worked with foresters to identify the best collection practices to improve seed tree germplasm (Koffa 2003). Other work shows potential to balance timber production for household use with competing fodder species through careful management (Poffenberger 1990). Studies of forest users have also shown that long-term residents are capable of balancing both scientific and natural perceptions of biodiversity (Borrini-Feyerabend 1997).

Understanding how, why, and where forest users collect, transfer, and plant seeds has relevance to both forest users and conservation scientists. Elsewhere in the Philippines, and sometimes in places where reforestation is most critical to local communities, practices involving replanting of native trees have not been studied. Work surrounding the investigation of native reforestation requires an awareness of local knowledge and its interaction with upland forestry policies.

Thus, there is an urgent need for investigating native tree management as an important component of local knowledge. An approach that documents local knowledge while maintaining sensitivity to access and control of resources and power relations may be helpful in determining the opportunities and constraints to incorporate local knowledge into forest management efforts. My approach utilizes Berkes' framework of local knowledge defined as knowledge within a geographic boundary (such as a particular forest or protected area). Determining how to identify local forest users, what they know and how to understand and represent their knowledge will be taken up in the next chapter on methodology.

3. METHODOLOGY

This study is designed to investigate how forest users use and conceptualize particular forest areas according to their own priorities and categories. This research strives to understand forest knowledge of forest users and the resulting implications for forest management. This chapter begins by describing how I came to the Philippines under the auspices of the Peace Corps. I describe the theory behind my research framework and my approach to using multiple methodologies. Next, I describe how I determined the sample of key forest users which comprises the major data set for the study. I conclude with a discussion of my data collection methods and the limitations of this approach.

3.1 Research Context

I first came to the Philippines in June of 1999 as a Peace Corps volunteer to serve as a Protected Area Educator. I was assigned to the Philippine Endemic Species Conservation Project (PESCP), a German-based organization that operated a research station serving as a study area for German-funded research students and forest monitoring efforts on Panay Island. From 1999-2001 PESCP maintained an office in the rural barangay of Bulanao, a municipality of Libertad, which functioned as a hub of environmental organization and clearinghouse for community-based livelihood projects that aimed to provide support to forest users in the area.

My role as a Peace Corps Volunteer included living in this small village and working with community members and nearby forest users on forest monitoring efforts. One of

my projects included designing, building, and installing hornbill nest boxes in the lowland forest. During the course of this project and my tenure in the Peace Corps, I developed trust and relations with several forest communities along with individual hunters, upland forest plot holders, and forest product collectors.

I returned to the surrounding communities in this site in the summer of 2004 as a researcher. During the course of my absence, PESCP and the local people's organization (PO) Biodiveristy Conservation Trust for the Philippines had succeeding in lobbying the Philippine Government for this area to be formally declared a national protected area. This area, officially termed the Northwest Panay Protected Area by the Department of Nature Resources (DENR), is my study site. A map of this site is depicted in Figure 3.

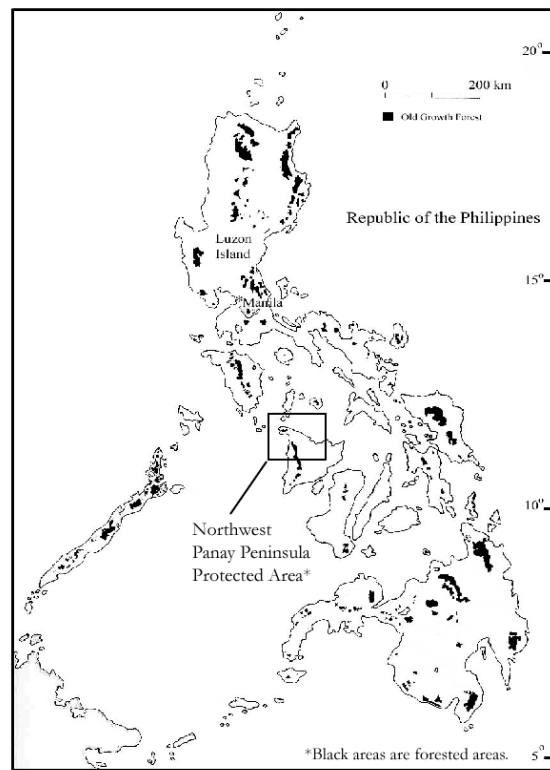


Figure 3 - Map of the Philippines and enlargement of Northwest Panay Protected Area.

3.2 Study Site

The Northwest Peninsula of Panay (NWPP) contains the last lowland rainforest in the entirety of the Western Visayas. Covering over nineteen-thousand hectares of primary forest and five municipalities, the NWPP has been referred to as “a hotspot within a hotspot” in national conservation priority setting workshops and publications (see Oliver and Heany 1997). The earliest official recognition of the ecological significance of this area came with the publication in late 1999 of Threatened Birds of the Philippines: The Haribon Foundation/Birdlife International Red Data Book, which states that the peninsula is perhaps the most important site for the conservation of lowland forest birds on Negros and Panay.

My fieldwork conducted in the summer of 2004 was my first return visit to my Peace Corps site since my service from 1999 to 2001. My role as a former volunteer was pivotal in helping define my research and in relations with forest users. Within my research site, local people viewed me in multiple ways: as a Peace Corps volunteer, NGO worker, researcher, hunting and fishing partner, a *puti* (slang for white-person) who enjoyed sharing stories in coconut wine drinking circles, a co-worker who shared discussions on leather couches with park maps spread across tropical hardwood tables. By living within the communities I worked for over three years, I believe I was seen as an individual outside of the problematic boxes that often exist in environments with complex histories.

3.3 Multiple Methods

My research design incorporates multiple methods. My methods involved participant observation, interviews, and sketch maps to document dimensions of forest knowledge. It also draws on what Blaikie (1999, 131) describes as “dominant epistemologies and methodologies” from both the natural and social sciences. This framework pays attention to both local and natural science claims, as well as to factors such as differential access and control over resources, scale of analysis, marginality, power relations, and ecology. As I detail in my approach below, my general research strategy uses multiple methods to address these issues.

Increasingly, researchers argue for approaches that combine rich information of forest users with methods that can speak to ecological questions (DeWalt 1999; Caniago and Siebert 1998). In my study site where both reforestation projects and conservation and development are emphasized, research that utilizes this multi-faceted approach is appropriate. I describe the participants that helped me generate this information below.

3.4 Describing Forest Users

Over the course of my field season, I selected eleven forest users (herein referred to as “key forest users”) as my primary sample of local knowledge holders. I selected them because they are locally known as “experts” and spend significant amount of time in the forest; they all lived in a forested area, several kilometers from a maintained road and near secondary or primary forest. All participants maintained forest hut or “camps” within secondary or primary forest. Four participants maintained additional dwellings in barangays (villages) proximate to the national road which circumnavigates The

Northwest Panay Protected Area. In some cases, this served as a resting place when transferring forest products to market. In other cases, these dwellings provided access to such resources as health care and schools. In one case, the key forest user lived inside an 80 hectare, non-native government forest plantation. In another case, the key forest user lived a several hour walk up river. In a third and isolated case, a key forest user lived in a research station maintained by a conservation organization. All of the key forest users and our research together were conducted in six municipalities shown on the map in Figure 3. The majority of our time was spent in either the protected area or in the buffer zone, just outside the protected area but still within forested areas.

All of my participants were at least second-generation forest users, meaning they had lived within the forest or were familiar with the forest areas from their parents. Over half of my study participants were third or fourth forest generation users—some of their information was based on passed down knowledge from grandparents or great grandparents. Everyone completed the third grade, but the majority of these key forest users did not finish high school. Key forest users all had gained familiarity with the study site through accompanying either a father or grandfather on hunting or logging expeditions in their youth. All are small-scale forest farmers; they cultivate “kainghin,” a form of swidden agriculture on ten hectares of land or less, usually on several smaller parcels of land. Many also gather both small-scale timber products and non-timber forest products. All of them are familiar with both medicinal properties of plants but have varied experience and desires to collect them. Some of the key forest users hunt. The proximity to a seasonal fishing industry, seasonal variation of tourism, markets and forest products were factors that led to my participants having very dynamic lives and

livelihoods. It was common for an informant to list fifteen individual livelihoods given the changes in markets and seasonality. Three key forest users have been employed by a conservation organization. Four have worked labor jobs off the island either on a yearly basis or routinely in construction or as agricultural labor. All key forest users but one was married.

The knowledge and categories of these forest users are described in detail in the next chapter which focuses on the aspects of forest user knowledge.

3.5 Contextualizing Forest Users and Use

These key forest users are land tenants, share-croppers who share landownership, and landless. Over a third of key forest users I worked with were landless; others held leases within the protected area buffer zone. Four key forest users were migrants with five or more years of experience who settled within the study site.

These key forest users have limited access and control of resources in the lowland agricultural areas. Limited land availability, land prices, and lack of employment opportunities were reasons only two key forest users were able to maintain residences in a barangay and were the only people in the study who owned property in the lowlands. These particular key forest users had access to health care, schools, roads, and higher paying wage labor options and additional forest product markets. Importantly, these key forest users spent the majority of their time working and living in the protected area buffer zone (see methods chapter for a description of the protected area and buffer zone).

Limited access and control to lowland agriculture lands was a primary reason key forest users cited for working in uplands. All forest users identified forest users and plots

within the forest that were abandoned for opportunities in the lowlands. Other key forest users resided in *sitios* (small villages) within forestlands in order to be closer to markets. These key forest users respond to changes in seasonality and markets. Key forest users would often give me a litany of occupations. During the course of my research, forest users would often visit other key forest users to barter and trade various goods and services or to discuss livelihood projects and options. Another forest user asked me to question their livelihood based on year and season. Table 2 (below) represents the diversity of livelihoods employed by key forest users. Key forest users stressed that many of these livelihoods were joint projects, often started in conjunction with a peoples' or upland farmers' organization.

Table 2 – Sociodemographic Characteristics of Key Forest Users (N=11)

Income and household livelihoods	N=11
Gender	
Male	9
Female	2
Copra (coconut harvesting, drying, selling)	2
Hunting for food consumption or wildlife	9
Former large-scale logging	1
Timber harvesting for light construction/household use	7
Non-timber forest collection for decoration, medicinal use	11
Poultry production	5
Swine production	2
Fish farming	1
Shrimp Collection	3
Maintain homegardens and tree nursiers	10
Fishing	10
Associated with a conservation NGO	2
Association with peoples' organization or upland forest association	11
Off-island employment (seasonal)	2
Carpentry	2
Formal Education	
3 years or less	9
Completed High school	1
Some college	1
Access to Land	
CBFM leases within buffer zone	3
Barrio/barangay residence	2
Sitio Residence	11
Landless	4

3.6 Participant Observation

I conducted participant observation with the 11 key forest users. This involved me accompanying them to the forest as they collected seedlings and wildlings and journeyed through forest areas. Typically, I worked with a single forest user or a group of forest users for several days, living, working, and traveling through the forest. I then returned to town to organize field notes and prepare for my next period of participant observation. These periods were designed to coincide with the work schedule of my primary informants (defined as key forest users below) and ranged from four to seven days at a time. During periods of participant observation, I carried a digital camera and photographed important forest features, seedlings, and wildlings noted by forest users. The file number was referenced in my “Rite in the Rain” field notebooks that I carried with me.

3.7 Interviewing Key Forest Users

After a period of participant observation with key forest users, I conducted semi-structured interviews with them assisted by my primary informant, a woman and respected forest user who had extended family members in each of the forest areas where I worked. Interviews were conducted in the local dialect, Kinaray-a. My primary informant was particularly helpful in determining the meaning of deep Kinaray-a forest terms that I was not familiar with. For my annotated interview guide, see appendix 1, section 8.1. To protect the identities of my informants, pseudonyms are used in both my field notes and this thesis.

3.8 Interviewing Conservation Organizations

During the course of my research, I also interviewed members of the local conservation organizations in the area. I did this as a means to compare what forest users told me about their relationship with outside conservation organizations with what the latter think and believe. There are three main conservation organizations in the area: these include members of the Northwest Panay Biodiversity Council and two conservation NGOs, Biodiversity Resource Conservation Trust for the Philippines (BioCon) and the Philippine Endemic Species Conservation Project (PESCP). In all, I conducted ten interviews with members of these three conservation organizations.

Selection of who to interview from the conservation organizations was based largely on their time constraints and who was willing to speak with me. In all cases but one (the field manager of PESCP), interviews were conducted with individuals who I had built a relationship and rapport with during my Peace Corps service. This sample included two former members of both BioCon and PESCP; these two individuals were included because of their long-term familiarity with NWPP. By their own admission (and my observations), all of these individuals were movers and shakers in Northwest Panay conservation scene, actively engaged in protected area management and tropical conservation writ-large. In the remainder of this thesis, I will hereafter refer to this group as conservation actors.

Interviews with the conservation actors were open-ended. Mostly, I asked them to describe their work including what they considered to be their conservation successes,

challenges as well as their relationship with local forests users. In addition, I brought up the emerging themes of key forest users during these interviews in order to solicit the response of conservation actors to key forest users concerns.

The conservation organizations, along with the results of these interviews, are discussed in detail in Chapter Five.

3.9 Creating and Interpreting Sketch Maps with Key Forest Users

A third component of my research included creating sketch maps with key forest users involving the forest areas they are most familiar with. As described by Peluso (1995), sketch maps (also known as place maps) are drawn by local people to show how they conceive of the landscape including personal relationships, history and nuances that conventional maps do not often include. Sketch maps are drawn as another method for researchers to understand the concepts and categories of local people. These maps are physical representations created by local people grounded in their personal experiences.

For this reason, locally drawn maps have rich possibilities to be used to document local knowledge. As cartographer Denis Wood notes, “an individual mental map is the external manifestation, in the form of sketches or drawings, of a person’s own spatial experiences (1973:53-54).” Without traditions of literature, forest users and groups have relied on their own “mental maps” for describing places and locations with detailed language and oral histories (Herlihy 2003). Others note that these maps have revealed personal reviews and knowledge of geography and environments (Wood 1993). Local maps that are drawn carefully “are works of art with great scientific value (Gonzalez et al. 1995:32).” Work concerning knowledge in agro-ecosystems shows

that certain forest users learn by both evaluating management outcomes and by observing the environment. Local sketch maps can be seen as way to begin processes of collective learning and assess resource concerns with one another and conservation actors (Eghenter 2000).

The literature on local mapping often acknowledges that mapping is an inherently political act, with real consequences for communities and local environments (Rocheleau 2005). Mapping and documenting boundaries can strengthen communities and also make them vulnerable to outside interests such as industrial agriculture or mining. In Northwest Panay, where both mining interests and conservation actors have generated maps of the forest areas, maps can cause major damage. This is because they make competing claims on land and resources explicit. On many major park maps (see, for example, Figure 3), forest communities are not identified. As Rocheleau (2005) notes, mapping efforts can be problematic by pre-defining scale, demarcating external boundaries (rather than boundaries set by those mapping), and relying on fixed boundaries and features, and categories rather than processes identified by forest users. Mapping is not a rigid method, rather it is a mediation between a,

“global positioning system and a local repositioning system....it brings us to unmapping, remapping, and I hope, multimapping...this process---using multiple media and from a diversity of perspectives--- can help people to rediscover, appreciate, define, document, and defend the historical and current meaning of their lands and to map their dreams for the future (Rocheleau 2005:358).”

A common, effective method of performing sketch maps is to ask local people to make sketch maps of areas with minimal instruction (Rundstrom 1987: 65-66). To conduct sketch maps, I provided large, 20 x 30 inch canvases of paper to draw out areas that the study participants worked in. Typically, maps were drawn with forest users over a course of four to five hours. Key forest users created extra maps to account for both large areas covered and significant details in particular forest areas. Since I worked around the schedule of forest users lives, this final component of my fieldwork usually required several visits or an overnight trip. These maps and semi-structured interviews were selectively analyzed to identify categories of forest users' knowledge.

Collectively, these sources were analyzed based on common themes, categories, and connections key forest users made. These maps were also used for confirming information about particular forest areas, such as when I had a question about activities within a particular forest area.

I created one or more maps with each key forest user. In some cases, key forest users were more comfortable making the maps in my presence, using them as a way to explain in detail where we had worked, traveled, and their representations of the forest. In other cases, they preferred to show me their completed map and we would review it together. When I had a question about a particular area, we would review the images on my digital camera to be sure we were discussing the same forest area. The resulting discussions informed my interviews and allowed me to confirm that the categories of knowledge I created from what key forest users explained during my fieldwork was as representative as possible. Results from these maps are discussed in the next chapter. The photographs in Figure 4 show key forest users creating maps.

3.10 Reliability

Reliability was addressed by corroborating the information I collected with other people who are considered experts about forest use within their barangays, sitios or geographical area. In all cases, they are individuals with whom I have developed trust, working relationships, and a deep reverence for. When operationalizing knowledge, the tendency is often to try to separate knowledge and belief and then to assimilate this into what a colleague (Temir, personal comm.) and others (Berkes et al., 2000) call “a scientific database.”

I made every possible attempt to document the quality of forest knowledge using terms and categories my participants use within the context of their own working lives. All conversations, interviews, and participant observation was conducted in the local Visayan dialect known as Kinaray-a. Occasionally, I used a trusted translator related to the forest user I worked with and not associated or employed by conservation actors. One upland community where I conducted interviews spoke a variance of this dialect, Hilaganon, and for this work I hired a separate translator to assist me during interviews. My strategy for coding data involved analyzing sketch maps for common themes and terms. In my interviews, maps, and observations, there are other local terms that provide additional description of my field research.

In working with forest users, I tried to be as reflexive as possible in my research approach. Reflexivity refers to interactivity between individuals and their environment (Wynn 1992). Once an emergent theme began appearing in my interviews regarding the relationships between forest users and other conservation actors, I expanded my

research plan to include interviews with the three local conservation organizations. These data, reviewed in Chapter five, provided additional insight on results I discovered with key forest users and became another way for me to understand my data. In this way, my methodology built upon themes gathered from forest users as the field season progressed. I stopped seeking out additional forest users to work with once no additional themes relating to my central research questions appeared in my data from both forest users and conservation actors.

3.11 Limitations and Strengths of Methods

Working with small sample sizes has inherent limitations. I made attempts to work with local forest experts, but there are few of them within my study site. The site is a lowland rainforest system that contains forest migrants and a history of migratory labor. At least one key forest user left the forest of NWPP to participate migratory wage labor opportunities on another island. Members of conservation organizations familiar with my study site were concerned that little relevant conservation knowledge exists among people whom I identified as forest users.

Despite the small sample, I used systematic efforts to ensure that I was working with local people who spent a significant amount of time in the forest. In selecting key forest users, I developed a checklist to make sure I was working with individuals who spent the greatest amount of time in the forest in respect to other people I met or knew. This enabled me to check and clarify claims made by forest users. For example, if a forest user claimed to be a ‘gatherer’ or ‘collector’ of forest products, did they actually gather from the forest or just a home garden? Where, specifically did they gather? Was

that area a former experimental development project? Was this area actually in the forest? I also created basic biogeographical sketches of all of participants. This ensured a diverse sample and made sure I was working with individuals who had experience which could directly help address my research questions. Others (Gadgil et al. 1993) have also noted that this type of data helps illustrate socio-economic, cultural, and political settings thus adding context to research. A complete table of these questions to identify key forest users may be found in the appendix (see section 8.2).

Another research limitation was my lack of time and knowledge to systematically compare and evaluate key forest user's nurseries using scientific methods. To get an idea of the success key forest users have in raising native tree species, I asked them to give me estimates on their mortality of a few key species. These results are listed in the next chapter. While the idea of local forest knowledge is not new, work that attempts to document local knowledge of forest users in this area had not been done. Finally, if key forest users are actively managing, cultivating and planting native trees as some of my data suggests, the implications for site specific and conservation efforts are numerous.

A group of people are sitting outdoors on a wooden bench. A woman in a pink and blue shirt is writing on a piece of paper. A man is holding a baby. The background shows trees and a wooden fence.



4. COMPONENTS OF FOREST KNOWLEDGE AMONG FOREST USERS ON PANAY

This chapter describes forest knowledge of upland forest users in Panay, Philippines based on research with eleven key forest users. It focuses on what I call “components” of forest knowledge. These are listed in the appendix (see 8.3). Sorted into themes, these components of local forest knowledge fit into three primary categories of knowledge: (1) geographic or area knowledge (GAK), (2) forest ecology knowledge (FEK), and (3) tree species-specific knowledge (TSK). Geographic Area Knowledge (GAK) refers to forest users understanding of forest features, resources, and land use patterns. Forest Ecology Knowledge (FEK) refers to knowledge about different forest ecologies. Tree Species-specific knowledge (TSK) refers to the practice of collecting seeds and wildlings from forest areas and replanting them. The research found this latter category to be the most extensive component of local forest knowledge. Within these categories of knowledge, several sub-themes emerged from interviews and participant observation: these are place, soil and microclimate, forest use and management, trees, and seed sources. These themes are summarized in the first column of the table below (see Table 3). The remainder of this chapter discusses these three components of local forest knowledge in detail. Unfortunately, there is currently very limited scientific survey work conducted that could be used to compare or verify this information. Nonetheless, I make an attempt to compare when it known about the information I gathered during my research. To the extent that local forest knowledge provides insights, it helps to make a case for conservation and research strategies that

involve both local and scientific knowledge.

4.1 Comparing Scientific Knowledge with Local Knowledge

I summarize below what I have learned about scientific knowledge related to forest conditions and processes in my study area; I do this to provide additional context to the results in this chapter. Botanical survey work within the study site has classified three primary forest types: limestone forest, lowland evergreen, and forest over ultra basic soils. The dominant species that describes these habitats are generally being described as being dominated by dipterocarps (Madulid 2002). As former and current research NGO project managers in the area explained, ecological research here has been primarily limited to birds and mammals (pers. comm.. and observation). At least one report (Koffa 2003) interviewed various informants regarding valuable tree species. While this data was valuable in checking both scientific and local names of tree species, the list composed primarily lumber and firewood species and not indigenous tree species that key forest users I worked with were actively involved with regarding the collection of germplasm I describe below. Another study (Koffa and Curio 2003) listed dominant tree types associated with particular habitat types. In the few cases I was able to confirm that the particular research transects were conducted in a particular forest user's working area (see Koffa and Curio, 2003), dominant tree species listed by scientists and forest users generally matched.

Table 3 - Categories and themes of forest knowledge as identified by 11 key forest users

Components of Forest Knowledge

Themes	Geographic Area Knowledge (GAK)	Forest Ecology Knowledge (FEK)	Tree-Specific Knowledge (TSK)
PLACE	Identification of planting, forest product collection areas, or geographic & historic areas of significance (n=11)	Knowledge about human use patterns and relationships to the change of forest areas, knowledge of wildlife movement patterns (n=7)* ¹	Use of local terms describe geology where wildlings might be found (n=11)
SOIL AND MICROCLIMATE	Soil types within forest areas (n=5)	Relationship of microclimate and soils, color of soil corresponding to “type,” seasonal fluctuations (n=9)	Tree-specific microclimate & soil requirements for trees, wildlings, and seeds (n=10)
FOREST USE & MANAGEMENT	Activities within forest areas (n=9)	Various tree/crop management strategies	Specific tree management strategies as relevant to forest area (n=4)
TREES	Identification of important tree habitat (n=9)	Association of area with particular forest type, Knowledge of succession/forest change (n=4)	Identification of key tree species in a forest area (n=9)
SEED* ² SOURCES	Seed dispersal areas (n=4), seed collecting areas (n=5)	Seed dispersal pathways in or through a forest area, understanding of fruiting phenology patterns (n=5)	Identification of particular “mother” trees as seed sources (n=6), differentiation between quality of seed/wildling stock (n=5)

*¹Denotes aspects of knowledge identified by less than the sample of eleven key forest users.

*²Seed refers to harvested fruit, tree seed, or wildling.

4.2 Geographic Area Knowledge (GAK)

Geographic Area Knowledge (GAK) refers to forest users understanding of forest features, resources, and land use patterns. These are particular places within forests and understanding about these places. Forest users organize this knowledge around themes of location, soil and microclimate, forest management, trees, and seed sources. This geographic knowledge is used to navigate the forest environment; it the basis key forest

users have for working within it.

Key forest users break down geographic areas of the forest into basins, soil types, water sources, slopes, ridges, seed dispersal areas, forest product collection areas, areas previously inhabited, and areas not occupied. These geographic terms are described using local Kinaray-a names and are not used on park maps. These terms are depicted on coded maps drawn by key forest users.

Soil types are described using a variety of terms that refer to color, acidity, and texture. Microclimate is often described in association with soil. Categories of microclimate include humid, moist, and dry. Different forest use areas are described as kainghin (swidden), plantation, rocky, copra (coconut gathering and drying areas), and hunting areas. Trees and forest areas are described in a variety of ways. Key forest users described forest areas as primary, secondary, and plantation. Forest areas were also classified by type such as bamboo, mother trees (collection area), plantation (such as mahogany or gmelina), and the prevalence of specific tree types. June, one key forest user, listed over thirty different tree species he used to classify both primary and secondary forest areas.

The categories of local geographic knowledge described above are interrelated. It is common for key forest users to describe forest areas using multiple terms that characterize geographic knowledge such as describing soil and microclimate type. When describing his home garden planting strategies to me, Ebon said:

“Soil is very important. When I plant, I evaluate the ability of soil to drain in different forest areas. Sometimes I have to collect soil from different areas to plant. Some clay or pula (red) soils are too wet. I pointed these out to you earlier in some of the basins.”

Evaluating soil this way—by color and touch was common among key forest users.

Embedded in GAK is description concerning forest management activities. Key forest users identified—at levels three to four generations back—who had planted groves of bamboo, coffee, banana or other fruit trees. Often, this knowledge was a narrative corresponding to changing land use, forest policies in the area, and suitability for upland agriculture or forest production collection. As Alfonso said to me:

“We stayed here for 60 years—the entire group, all of my cousins too. We did lots of planting—pina, sagging, coconuts, coffee, start apple, batwan, papaya, jackfruit, eggplant. We harvested in this area—about 9 hectares. We had ISF [Integrated Social Forestry] claims to use the forest and were known as the big hunters here—we had a reputation—people would come and order and we’d put out those old snares that are rotting [over there]. Up where we walked earlier, in Vsing’s and Malo’s area, up near the rocks, along the ridges, above Pedro’s and Agistino’s place. We’d work together. We’d travel to the Lumati groves (a kind of tree on the map) to harvest posts (for houses); we’d return down the ridges and descend to the basins (on the map) to collect batwan seeds for dinner. We found that old army helmet (near the fire) up river; it was lost during a conflict with the government and insurgency in the 1940s; there is a story about that too....”

Embedded in this knowledge of forest areas is a history that corresponds to geographic areas of the forest. This represents a different way of navigating through the forest, one that is connected to local terms of geography and priorities of key forest users. For example, all of the participants identified non-timber forest product collection areas as geographical areas of significance. During periods of observation, we traveled to specific areas forest users identified as good for collecting various grasses and vines for mats and baskets (banig, cogon, and rattan), river shrimp and snakes, edible and non-edible seeds, fishing talismans, coconuts, edible roots and palms, medicinal plants, and hunting areas.

Geographic information can also have folklore significance. One forest area where I worked, Malampati, was named by former forest users as valuable and important

watershed that now provides water for the municipality of Pandan. The story of Malampati involves a mythical fresh-water crocodile that travels the river traversing different forest areas within the watershed. Other geographic terms forest users identified have meanings related to forest myths and stories. In the same area, a group labeled an old hunting area Egugnana-kanyogan, an old Kinaray-a term that means “door of the mountain.” Surrounding this area were other names for forest areas. In some cases, particular forest areas were named for current or former occupants. On such area was known as “Edak ne Oden.” The term “edak” corresponds to a vernacular term of power and respect (Oden is the pseudonym of a particular forest user). When I visited Oden, I found the forest area named after him was suitable: he added spring sources, geographical features, and names of hunting areas to his sketch map. In each area, he had a working knowledge of others who had lived and worked in these forest areas prior to his presence.

Others discussed soil types and patterns as an important component of GAK. All key forest users discussed and labeled places of folklore on sketch maps. These beliefs are not directly related to my research question. Nonetheless, I have included a brief discussion on the relationship of folklore knowledge to categories of key forest users knowledge in the appendix (see 8.4).

4.3 Forest Ecology Knowledge (FEK)

Forest ecology is the second component of key forest users’ local knowledge. Key forest users use ecological knowledge to manage the forest, find and harvest forest products, and to farm. For the majority of forest users, the acquisition of ecological

knowledge is based on direct working experience of forest areas, observation, and time spent in the forest. This builds on the category of GAK. While FEK requires an intimate understanding of geographic knowledge (GAK), ecological knowledge is based on understanding processes within particular forest places. Tye describes this relationship:

“I came to this place—this 8 hectare plot—without knowing anything. I left school at grade three because my parents couldn’t afford materials or a uniform. I also wasn’t originally from here. I built a payag and settled in the forest. On some adjacent land I borrowed land from a neighbor and, together, we sold fruit. I found time to make excursions into the forest—I learned the features, I explored. I would camp for one week in the caves of the Lanok areas during the fruiting seasons. I’d look for potential fruiting trees and visit others that I thought might be fruiting. Sometimes I would know where to go because there were other forest areas—like this one—that were inhabited. People had payags [forest huts]—we shared information. I learned that some of the soil—in the cooler basins adjacent to the river was maalit [bad]. Others were pula [red]. I put these pieces of information on my on map and marked them on the one we made.”

All forest users have particular place names that correspond to ecological characteristics of forests. Terms described soil moisture, presence of particular trees or vegetation, dispersion pathways, flight patterns of particular birds, or wildlife occurrence and specific wildlife habitats, and their occurrence with particular forest vegetation. Key forest users also have the ability to evaluate particular forest areas based on canopy structure, wildlife, and diversity of tree species. One key forest user described the process of using this knowledge as:

“When I go into the forest, there are a lot of natural forest boundaries. Particular areas I like to hunt in, the Lumati (a particular tree species) lugar, for example-- the area is bounded by rocks. A ridge changes the air. It is cooler; the soil is more moist. There is an edge to the canopy there and the soil is pula (red) in the tree shadow but in the lanok area, the soil is red, brown, and grey.”

This theme of necessary soil, air, and moisture conditions for forest plants was identified by all key forest users. As Tye told me, “Our ideal forest is actually different lupa—lands in forests that are suitable to different seeds and things we collect. It depends on the soil, moisture, and temperature.” Other key forest users noted their attempts to mimic different microclimatic conditions based on their forest knowledge. Vsing told me:

“This plot of land here, my ‘garden’ is planted on a slope both because this is the land I can use and it creates different conditions. Down next to the river I plant hawog (a plant used for bindings)—it is better on the steeper and wetter soils. Nito (a vine for baskets), is similar this way. It only grows wild with particular kind of wet soil.”

In addition to knowledge concerning the microclimatic requirements of particular species, key forest users made extensive lists during interviews of products harvested during different months of the year. Key forest users related seasonal forest product availability related to changing seasonal moisture, precipitation, and wind patterns. Forest users also spoke of environmental degradation and unnatural disturbance. Galo-galo (bad land use practices) were described as management practices which contributed to soil erosion and using an excess of chemical inputs. Key forest users

described good land use practices as using leaf litter to add nutrients to the soil and diversity and planting a diversity of fruit and timber trees along the border of upland plantation areas. The actual use of this knowledge varied among key forest users.

All key forest users had distinct knowledge of crop and tree management strategies based on products harvested. Most of them understood wildlife movement patterns; some were able to document important seed dispersal areas relative to seeds they collected. In one case, a forest user mapped dispersion of forest trees with local, seasonal wind patterns he observed. Another forest user drew ‘river pools’ where he collected seeds during flooding events. Tye discussed seed movements in relationship to wildlife. “During the breeding season (of hornbills and other birds) we watch for activity and flight patterns.” This tells Tye what species of birds are present and general areas where forest fruits may be present. Six of the forest users I worked with actively collected seeds and seedlings from native forest trees.

Regarding the details of key forest users’ insight surrounding ecological knowledge, I found it challenging to communicate with both key forest users and conservation actors without a common definition of ecological terms. Among key forest users, there was little use of common terms to describe key aspects of forests (such as soil, microclimate, succession patterns) that help provide insight for actual forest management. The next component of knowledge, categorized as tree-specific knowledge yielded some more interesting results.

4.4 Tree-Specific Knowledge (TSK)

The practice of collecting seeds and seedlings from forest areas fell into a separate

category, which I term tree-specific knowledge (TSK). This type of knowledge involved forest users collecting seeds or wildlings from forest areas and replanting them in home gardens, plantations, or market. Among the eleven key forest users who comprise my sample, six collected and transferred seeds and wildlings to these areas. While many forest users collect seeds, these six individuals produced seedlings and provided quality germplasm to community members over many years. I have organized the discussion of tree-specific knowledge into the following headings:

- **places and trees:** important forest areas and tree species identified by forest users
- **microclimate and seasonality:** criteria for identifying and selecting mother trees and understanding of fruiting patterns
- **seed sources:** local criteria for selecting seeds and wildlings (germplasm)
- **forest management:** transfer, planting, and storage techniques of germplasm
- **outplanting** success and management of planted areas, and
- **adaptive management strategies** and reasons for transferring germplasm
-

4.4.1 Important forest areas and tree species

All key forest users with tree specific knowledge identified forest areas using tree names. These corresponded to important tree species identified by forest users describes primary species collected, local and scientific names, collection method, and tree use (Table 4). This table represents important tree species as defined by the key

forest users.

Table 4 - Important tree species as identified by forest users

Local Name	Scientific Name	Seedling Collected	Wildling Collected	Known Uses
Narra	<i>Pterocarpus indicus</i>	X	X	Lumber, fire, firewood
Red lauan	<i>Shorea negrosensis</i>	X	X	Timber, tanning?
Balakbakan,	<i>Shorea polysperma</i>	X	X	Housing, fuel, construction
White lawan, Bagtikan-lawaan	<i>Parashorea malaanonan</i>	X	X	Furniture, interior finishes, boat planking, veneer
Saria almon	<i>Shorea sp.</i>	X		
Tabow	<i>Spygium sp.</i>	X	X	
Lumati	<i>Syzgium sp.</i>	X		
Gisok, Almon-lawaan	<i>Shorea guiso</i>	X	X	timber, housing, posts, lubrication, soap, cooking
Yeekaw	<i>Evodia sessilifolia</i>			bolo handles, furniture, natural fencing
Yayay				edible fruits
Mala-iba	<i>Microcos stylocarpa</i>	X		
Gogo (not endemic to Philippine Visayas)	<i>Aglaia edulis</i>	X	X	boat and house construction, edible seed, medicinal prop.
Lamoti	<i>Syzgium sp.</i>			
Balit	<i>Lepisanthes rubiginosa</i>			timber
Tan-ag	<i>Klienhowia hospita</i>			
Dural-og	<i>Ficus nota</i>			fruit, forest cover
Kalantas	<i>Toon surenii</i>			
Batwaan	<i>Garcinia binucao</i>	X	X	edible seeds, firewood
Nato	<i>Horsfieldia megacarpa</i>			food additive, lighting oil

4.4.2 Criteria for Identifying and Selecting Mother Trees and Understanding Fruiting

Patterns

Key forest users collected the above species as wildlings or seeds in specific areas identified on sketch maps. All collections occurred from specific mother trees or areas forest users identified as a group of ‘mother trees.’ These areas varied from single trees in a particular area to a group of more than 100 mother trees. Key forest users described ‘mother trees’ as trees particular good for producing viable seed stock.

Criteria for selecting mother trees included straightness of bole or trunk, accessibility, and health. They judged this by growth of epiphytes, canopy size and quality, leaf quality, and access to canopy gaps and light. While most key forest users collect seed and seedlings from a group of trees in one particular area. Distance between trees was not a factor mentioned in interviews when discussing collection strategies. Seed collectors generally described distances between collection trees as 10, 50, 100 meters or between one and three kilometers. During fruiting months, forest users patrol a large swath of forest area based on their knowledge of tree areas, bird movement patterns, and when particular species will fruit. All six key forest users were able to list fruiting phenology, or the availability of particular seeds according to month. Ebon explained:

“Every time I’m going into the forest, I’m always making a map of where the trees are; looking for new bird nests; woodpecker holes, light gaps—anything that could trigger a particular tree to fruit. Once I see flowers in a particular tree; I generally know what seeds will be available when.”

A timetable, confirmed by key forest users, describes the flowering and fruiting of select tree species is listed below (see Table 5).

Table 5 - Timetable of flowering and fruiting months of selected tree species

Tree	Flowering	Fruit/Seed Harvesting
Dipterocarp family (Lauan, White Lauan, Bagtikan-lawaan, Saria-almon)	January-February	October-December
Nara	January-April	August-September
Tabow	January-April	August-September
Nato	August	August-September
Batwan	January-April	April-September

Key forest users stressed that they used these mental timetables only as a rough guide—individual trees do not produce seeds annually and is based also on local weather

patterns and climate. Tree age and location were also said to influence variation in seed availability and production.

4.4.3 Seed Sources: Local Criteria for Selecting Seeds and Wildlings

Key forest users stressed collecting “good” seeds in order to minimize mortality and propagate healthy trees. Good seeds are differentiated from seeds that have holes created by bugs, soft or partially rotten, and seeds that are not round. The ‘challenge’ June explained, is collecting mature seeds that are ready for transfer and planting. Forest users explained that maturity is judged by color. This is generally dependent on tree species. Mature seeds in the dipterocarp family, for example, have a rich brown color. They stressed that dipterocarp family trees should ideally have seed ‘wings’ prior to collection. If a stem has begun to germinate from the seed, key forest users inspect the quality of leaves and buds. Other seeds have special characteristics that make them more viable. For example, Nato seeds should have a small open margin bisecting the middle. These giris [cracks or ruptures] are signs that tree seeds are germinating.

If seeds are germinating or present at a collection site, key forest users recommend waiting at least three months until seedlings begin to develop a root system prior to transporting. Once healthy roots are established, wildlings can hand pulled from the forest floor or, as I observed when traveling to collection areas, wildlings may be uprooted from rocks, steep cliffs or other trees. Sometimes it is necessary to wait until a wildling has developed a root system that will give the tree a good chance of survival when replanted. Because of various ecological factors (substrate, soil, microclimate),

key forest users agreed that wildlings could be “harvested” from a collection area from approximately three months to one year with a chance of a successful replant.

Forest users noted that both seeds and wildlings can be harvested for many trees.

However, practice and experience led individual forest users to have better “luck” with harvesting either seeds or wildlings of a particular tree species. For all tree species listed in table four and five (above), key forest users were able to agree on best harvesting practices of seeds and wildlings for species they collected. Some tree species, for example, are best collected as a seed. Other tree species are best collected at either less or greater than three months.

4.4.4 Methods of Germaplasm Transfer

Transporting seeds from forest areas is done in rice sacks or plastic bags. If the transport is long, seed moisture is maintained by immersion in a water source to minimize moisture loss. If transport distance is short, wildlings may be carried by hand and planted or stored directly. For distances longer than several hours, wildlings are placed in small, round nursery bags for maintaining moisture and placed in a sack. One or both bags are usually immersed in water. Ideally, these transfers are done in the rainy season with frequent rests to add water.

After arrival to planting site, wildlings are placed in a shaded area, ideally off the ground and with some kind of fence, usually with posts or fish netting that minimizes chances of predation. During the rainy season, wildlings need to be partially covered. Five of the key forest users transported seeds from upland collecting areas to lowland plantations or forest huts. In these cases, forest users transported soil from the

collection site and mixed it with local site soil prior to planting seeds or wildlings in nursery collection bags (forest users noted higher success rates with mixing soil). At one site, transported wildlings were placed on a raised wooden platform approximately one meter off the ground. The platform was covered with a layer of plastic and a layer of mixed soil. Wildlings were placed in bags with the bottoms removed or directly on the soil medium. This enabled growth and minimized stress on the wildlings.

Watering was done during the dry season and wildlings. To minimize amount of water and ensure drainage, Tye used a mixture of ground coconut hulls and wood shavings to conserve water. During this time, regular checks are made for seed worms and beetle eggs and larvae.

After two years, young trees can be transplanted. Forest users noted that the trees from the dipterocarp family are often planted one year later, depending on the health and appearance of the young tree. Three key forest users transplanted trees to a steep slope to ensure proper soil drainage. Fruit trees were also planted on the slope to minimize erosion and provide protection to the trees. One forest user transplanted seeds to a flat forest area hut, in fruit tree plots to provide ‘cover and protection for the young trees.’ Other key forest users transplanted wildlings to slopes upland forest plantations for to help protect the edges of forest plantations. Key forest users all stressed the problem of leaves of planted trees were used as fertilizer for upland plantations.

4.4.5 Outplanting Success and Management of Planted Areas

Key forest users keep mental records of their trials and some minimal records of seed or wildling sales. Ebon explained that in his “nursery” he kept mental records and made

sure he could confirm his observations by keeping seeds and wildlings separate so he could monitor both individual trees and different species. Ebon said, “I have a relationship with each batch of trees I plant; I monitor how they grow.” Estimates of survival rates of tree species important to forest users is listed below (see Table 6). The number planted was confirmed by counting when possible; otherwise these are key forest user estimates. Each row represents information from an individual forest user. Germplasm sold or given to community members is not included in this table.

Table 6 - Survival rates of local germplasm as estimated and monitored by 11 key forest users

Tree Species	# spp. Planted	Estimated Survival Rates
White lauan	>500	66%
Red Lawaan	>500	66%
Gesok	200	50%
Nara	17	90%
Tabow	50	>50%
Almisiga	50	>30%
Blackblackon	50	>30%

4.4.6 Adaptive management strategies and reasons for transferring germplasm

Key forest users transfer seeds and wildlings from upland forest areas to other areas for a variety of reasons. Figure 5 illustrates different pathways of germplasm transfer. Seeds and wildlings are transferred from mother trees in secondary, primary forest areas, and working agricultural areas throughout Northwest Panay. Most key forest users re-plant germplasm in secondary forest due to the accessibility of lower elevations, milder climate, light gaps, and disturbance. Some key forest users use establish tree nurseries in these areas. Two key forest users replanted wildlings on the

edges of upland agriculture areas. These native out plantings are used to provide fertilizer and protect from wind and erosion.

All key forest users initially transfer collected seeds or wildlings to a home garden or plantation where regular watering and monitoring can occur. Key forest users stressed this was particularly important, especially in low-lying areas where ocean breezes and heat can affect wildling mortality. After wildlings have reached maturity in home garden nurseries, successful wildlings were re-planted in ISF areas, forest areas near or within home gardens, or lowland plantations.

There is a limited seed and wildling market on the island of Panay. Four key forest users made sales to local buyers, the DENR for island-based nursery projects, and community members. Key forest users emphasized the need to maintain quality germplasm as a direct result of large-scale adoption of non-native seeds and wildlings such as mahogany (*Swietenia macrophylla*), ipil-ipil (*Leucaena leucocephala*) and gmelina (*Gmelina arborea*). Key forest users, even those who did not collect seeds and wildlings, noted negative effects on soil, wildlife, and habitat quality that the large scale planting of these exotics. As a result, local demand for quality germplasm is high. Forest users noted the good of planting native tree species as informed by both their own observations and local, conservation education campaigns. June told me:

“We have our own experiments. We mix different soils and try to see what strategy works best. I don’t know what the law about this is, but this is how we live, how we have to work.”

Another forest user, Ebon, described himself passionately as a tree planter.

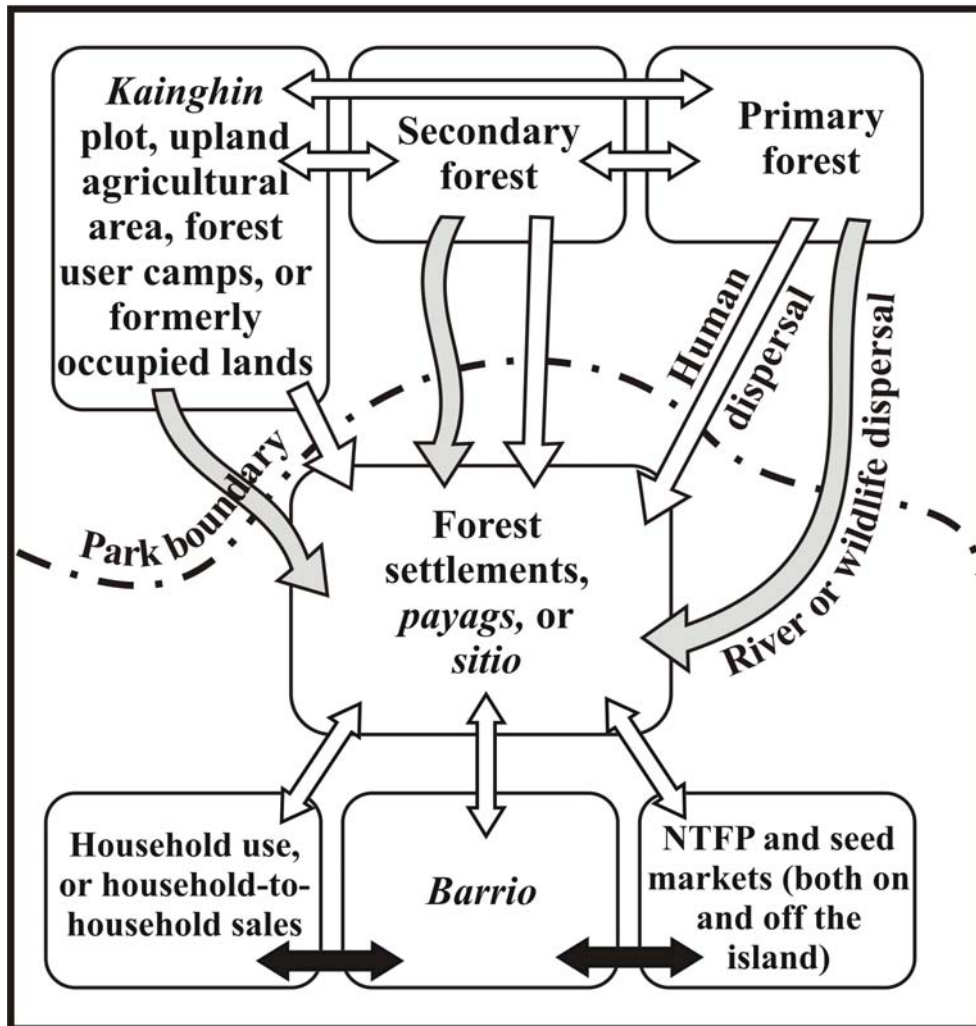
“This is what I do. Over the course of the past fifteen years, I’ve planted thousands of trees. I sell some of these for timber; others I use for protecting my kainghin (upland agriculture plantation), others I leave for my son.”

Key forest users identified these reasons as integral to their collecting strategy. In addition to nurseries, key forest users often transplanted seeds and seedlings to sitio or barangay residences in order to have the “satisfaction” of native trees, attract wildlife, create shade. Ownership of trees also provides valuable species for that can be used for construction or resources for future generations. One forest user described this practice as practices “in danger.” Oden explained that key forest users are creating nurseries farther from forest trails, home gardens, and residences because of forest patrols. Tye responds to forest patrols by spacing his working forest areas farther apart. I search for pig trails and signs; I look for places I won’t be bothered or disturbed. This theme, of outsiders interfering with forest use and forest users was prevalent.

During one mapping session with Tye and his family, a member of the Bantay Gubat, or forest guards walked into a forest hut. We packed up the map. After the forest guard left, I wondered about the challenge of sharing knowledge and information in this environment. Tye lowered his voice: “Here, it is sometimes difficult to share and teach this information; if we can’t work in the forest, how can we live?”

Figure 5 - Germplasm pathways through the forest according to key forest users

Transfer of Trees, Wildlings & Seeds



- ← Forest user transfers
- ← Natural transfers
- ← Secondary user transfers

This existence of germplasm transfer mechanisms, seed and nursery management strategies, and relative success at managing native tree species is an example of Berkes' "land and resources management" category depicted in Figure 1. The table above represents the use of locally available, forest materials. However, it also represents what key forest users have identified as systems that work within their understanding of GAK, FEK, and TSP.

4.5 Sketch Maps

This chapter would not be complete without demonstrating the connection between key forest users' categories of knowledge I generated from the interview and participant observation data with the sketch maps drawn by key forest users. As the literature review and my methodology notes, one of the keys to successful sketch maps is the remembering and re-mapping of relationships. Rather than displaying elements of the forest as simple two-dimensional representations of resources and habitats, maps become dimensional and dynamic when specific areas are described as areas of seed dispersal and microclimate variation. Some of the maps (see Figure 6) are large scale drawings that show important forest paths and pathways of movement throughout forest areas; other maps (see Figure 7) are more detailed, "zoomed-in" illustrations of seed collection areas that depict mother trees and germplasm collection areas. This data is extremely useful in seeing alternative ways key forest users annotate the forest with their own priorities, observation, and knowledge.

These maps helped me to understand special areas within the forest, to confirm the categories of forest knowledge I presented above, and to follow up with key questions about forest users work in particular forest areas. This was particularly valuable when

understanding relationships between key forest users and conservation actors. This is the subject of the next chapter.

Figure 6 - Key forest user sketch map depicts a particular forest. This map describes place relationships and key forest movements and special areas within the forest.

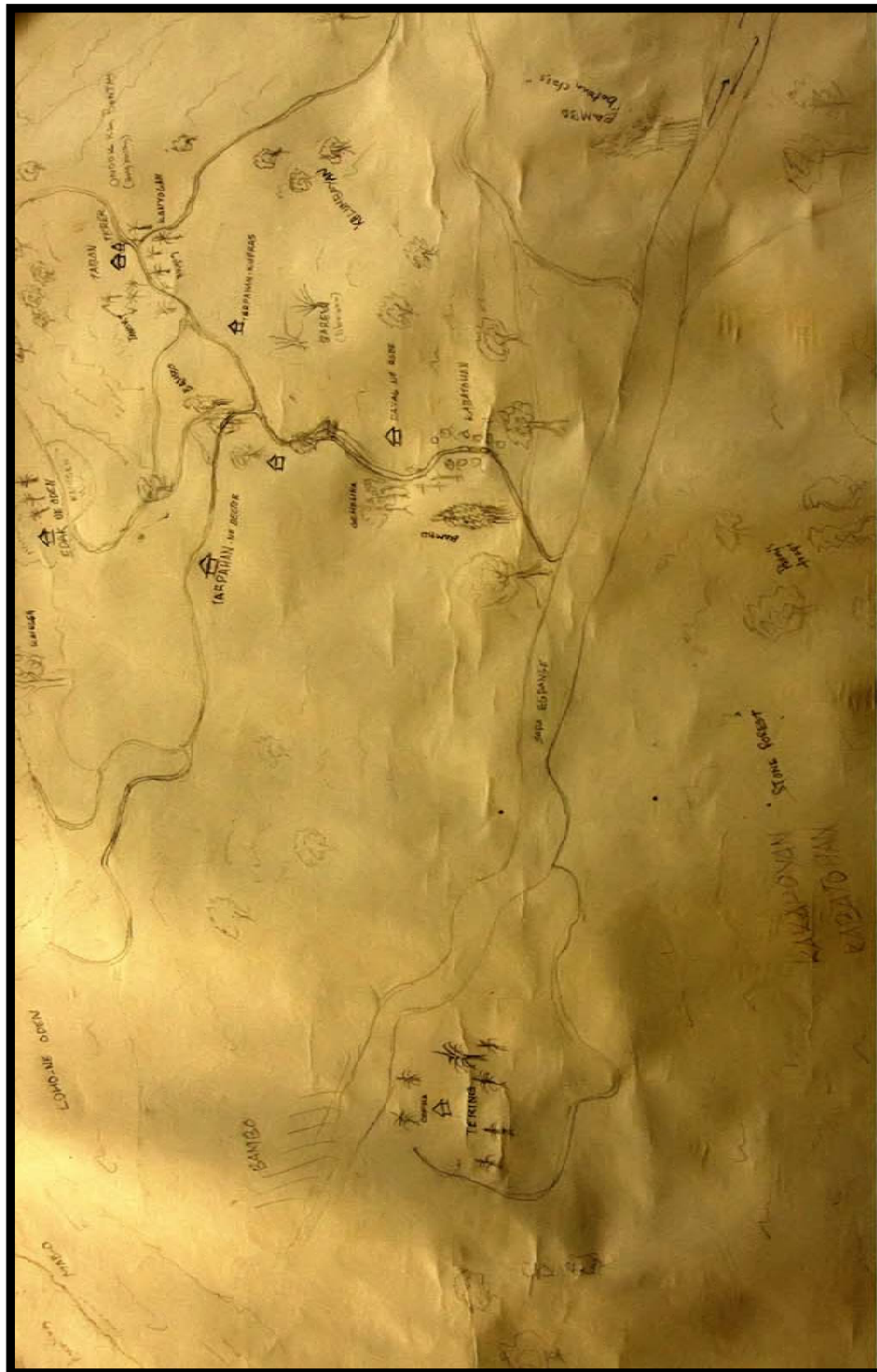
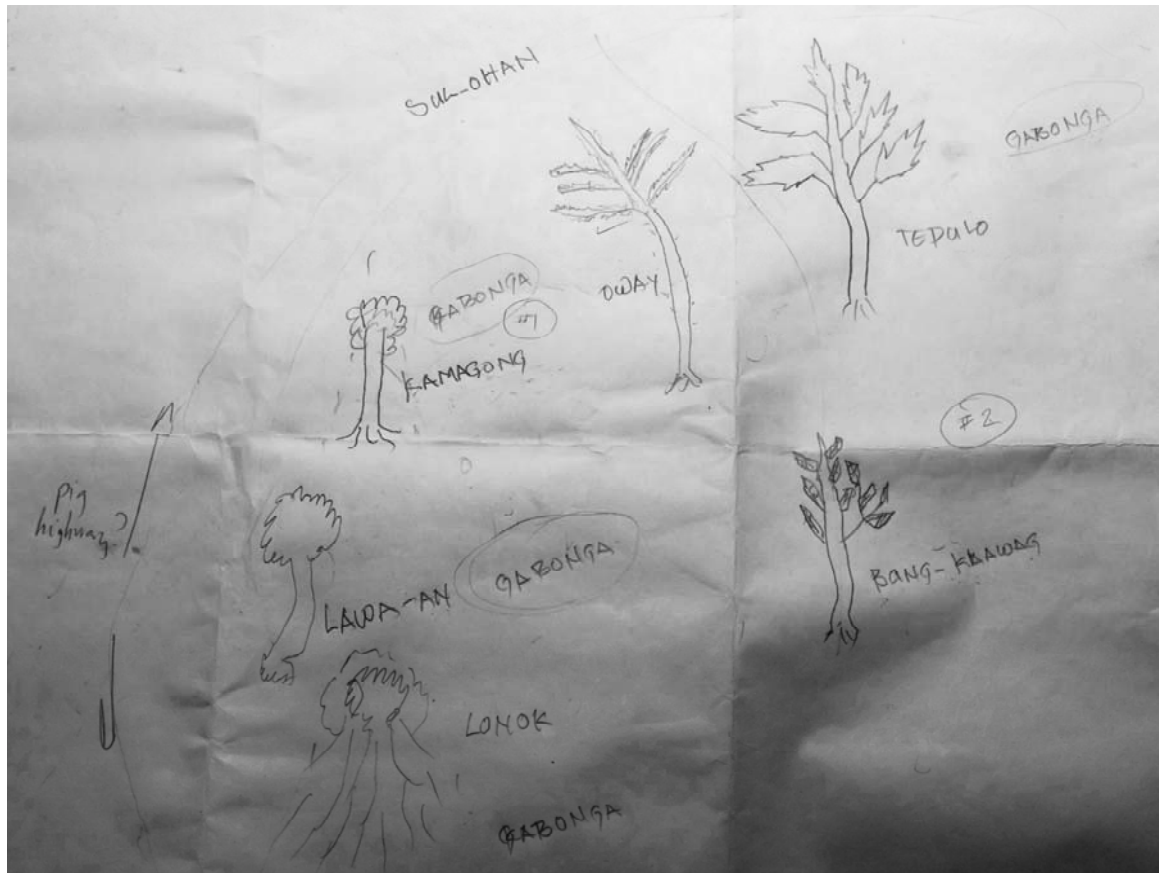


Figure 7 - A zoom-in of a key forest user map that depicts important trees and germplasm collection areas.



4.6 Chapter Summary

This chapter discussed three major components of local forest knowledge of key forest users based on geography, ecology, and tree-specific knowledge. Key forest users demonstrated a working knowledge of these aspects of the forests. Six (of the eleven key forest users in my sample) actively manage and transfer germplasm. Photographs on the next page illustrate these individuals working with seeds, wildlings, and trees.

The next chapter discusses how these categories and concepts of local forest knowledge, are understood by local conservation organizations in Northwest Panay. Understanding the role other conservation actors play in what is considered forest knowledge, and who and how knowledge is used, is essential to understanding the obstacles existing at present for local forest users and conservation organizations to work together. I argue it is also important for understanding opportunities for how local forest users' knowledge could potentially be incorporated into forest and tree management in the Northwest Panay Protected Area.

4.7 Photographs Demonstrating Seed, Wildling, and Nursery Management by Key Forest Users

Figure 8 - Coconut hulls and wood chippings to minimize water loss for wildling and seed plantings.



Figure 9 - June stands outside lowland nursery fencing which houses wildlings while his son watches.



Figure 10 - Wildlings are placed in plastic containers used mixed soil. Rice hulls help increase soil drainage.



Figure 11 - Monitoring health of planted wildling



5. KNOWLEDGE AND RELATIONSHIPS TO REFORESTATION AND CONSERVATION IN NORTHWEST PANAY

This chapter discusses the relationship between key forest users' local knowledge and concerns with forest management efforts and concerns of the three conservation organizations in Northwest Panay. The chapter begins with an overview of conservation organizations in the study site. Next, I discuss key themes from interviews with key forest users and members of these conservation organizations. The views brought forth by each suggest competing forest management priorities, and problems involved with the two groups working together. I argue that these differences contribute to an inability of conservation organizations to accept and respect any type of local forest knowledge, and results in a very limited role for forest users to be involved in forest management and conservation in the Northwest Panay Protected Area. Overall, this chapter develops the case for acknowledging and integrating *components* of key forest user's knowledge into forest management.

5.1 Conservation Organizations in Northwest Panay

The protected area of Northwest Panay is managed by three conservation organizations with offices based in Northwest Panay. These include Northwest Panay Biodiversity Council, and two environmental NGOs: BioCon (Bioconservation Trust for the Philippines) and The Philippine Species Conservation project (PESCP).

The Northwest Panay Biodiversity Council is composed of a park superintendent, mayors from the five municipalities surrounding the park, and members from two environmental NGOs. Together they compose the Protected Area Management Board which

administers the National Integrated Protected Area. BioCon (Bioconservation Trust for the Philippines) coordinates protected area conservation efforts and meetings that concern park management. The Philippine Species Conservation project (PESCP) is funded by the Frankfurt Zoological Foundation. PESCP maintains a research station within the Protected Area with permitting authority from the Department of Environment and Natural Resources (DENR) of the Philippine Government. During one week each month, an observer from the regional DENR office spends a week in the field station patrolling for illegal logging activities. Also, PESCP hires a squad of approximately 20 men to conduct patrols throughout the forest using the name *Bantay Gubat* (translated to Forest Guard) in addition to conducting livelihood projects and running anti-poaching campaigns.

As noted in my methods chapter, I interviewed a total of ten members from each of these three conservation organizations. I highlight the differences between attitudes about forest management by members of the conservation organizations and key forest users first generally and then in greater detail, emphasizing topics of forest patrols, dominance and power, and forest management.

5.2 Forest users and conservation organizations – lack of access to information, funds, and one another

All of the key forest users in my sample cited a lack of communication between themselves and conservation organizations as a problem that impeded one or more of their forest-based livelihoods. Key forest users involved in upland farming associations complained of not being informed of meetings and having little knowledge of the protected area, including the extent of its boundaries and especially what constitutes

conservation objectives and approaches. Both key forest users and conservation organizations noted numerous misunderstandings and problems regarding forest use and resources.

For example, one of the key forest users in my sample was prosecuted for selling native timber he grew on his plantation located outside of the protected area. He grew this timber as part of his personal efforts to reforest his lands which included establishing nursery space for native trees. When I inquired about this case, I was informed that local police traveled to the individual's home after being informed of a timber sale by a conservation organization. The key forest user cited his right to grow trees, restore his land, and his ignorance of local government policies. This particular forest user continues raising native trees but has moved further into the forest so he will not be caught. Stories of confusion regarding the complex rules and regulations associated with the Northwest Panay Protected Area were repeated to me in several versions by local forest users.

Two of the conservation organizations, both BioCon and PESCP raised frustration regarding issues related to access and control of information, resources, and funds related to the protected area. At least one member from each conservation organization stated they were not always aware when new policies were created or park management meetings were to be held. One conservation organizer discussed the lack of access to studies and research within the area as a major problem. He told me that all of the relevant data regarding native nursery pilot projects had been intentionally deleted from a hard-drive because he was frustrated with competing conservation agendas. Apparently one of the key forest users knew about this and related, "You can ask us what we know

and think. We might not know. But we might be able to tell you about our experiments and results with the land; and we can certainly talk to our friends about their ideas. That is our kind of library; we try to allow access to our information and ideas for ourselves and others.”

Key forest users told me that they did not have access to meetings of the Protected Area Management Board, or to meetings with either of the NGOs. This could be related to the difficulty of communication in the area. For example, when I was stranded in the field for a day due to bad weather, challenges with communication were evident. None of the communities forest users resided in had telecommunications. During other parts of the year, especially the heavy rainy season, farm to market roads are often passable only by motorcycle. NGO involvement was low in particularly remote communities.

5.2.1 Problems of meanings and terms

Forest user groups noted that different conservation organizations had different meanings associated with forest management. All conservation organizations mentioned problematic use and multiple meanings of local terms such as harvest, kainghin, and hunting. These terms made dialogs and meetings with local forest users difficult. It was particularly limited because the representatives of the organizations rarely if ever went into the field with local forest users, or asked them to make sketch maps.

5.2.2 Conflicting ideas of forest management

Not having the authority to influence forest management policies and behaviors by conservation organizations was a major issue for all the key forest users I interviewed.

Forest users in one community complained about acidic soils that were created by former non-native tree nursery projects. In this community, local people effectively lived and worked on eighty hectares of leased land. The key forest users who collected germaplasm, explained that they needed to access parklands to collect wildlings and seedlings of sufficient quality. But they were not permitted to do this. In another community, forest users felt like they were unable to collect native seeds and wildlings because they did not own or have access rights to adequate nursery lands. Even though there are no rigid laws on the books, frequent patrols by the DENR in the area made them feel intimidated and afraid to freely move about the forest.

Local intimidation is exacerbated by the fact that local conservation organizations do not understand or respect local livelihoods and resource tenure yet they have considerable influence on them and forest policy in general. In one case, a family received a letter from a local conservation organization informing them that they could no longer conduct kainghin (swidden agriculture) on their leased land. At the community meeting, local government and conservation officials explained that this practice was outlawed given a new local proclamation between mayors and a conservation organization. They inquired about how to get food and were told to work harder or find another livelihood. Those present at the meeting explained that there “are no other jobs.” Although these requests or even local executive orders are not yet enforceable in my study site, Tatay told me, “...So, because of this, I’m a little afraid. I’m told I can’t use and manage my land. We are monitored by people because they pass by our forest camp.” Another key forest user, Nesto, asked, “How can I feel secure with my land title when I can’t sell some trees I’ve worked hard to grow?” Nesto is a self-described farmer and seed collector who

maintains a residence within a forest sitio. During the course of my fieldwork, in a second incident of lumber confiscation, local officials confiscated some of his lumber from native trees he had grown on lands within his forest plot. He argued that the native lumber was his to sell given that he propagated his own seeds and practiced methods of management which were consistent with his knowledge and experience. These included limited, prescribed burning, crop rotation, and the management of germplasm described in the previous chapter. Nesto summarized the dialog this way:

“Planting is bad I was told; management of trees is something I shouldn’t do; kainghin is something that I can’t do. Officials aren’t listening to my information. They also aren’t giving me information. I’m told that all resource use – even on my land—is bad. There is no debate. I have no power or recourse.”

Key forest users often referred to conservation and management policies as a group of rules made “just for us.” As one key forest user explained, “We are told by others that everything is bad—bird trapping, kainghin, fishing. Issues surrounding power are central to tensions surrounding forest management in the study site. All key forest users discussed issues of their limited power to influence forest policy as also related to issues regarding forest patrols and dominance of conservation organizations.

5.2.3 Forest Patrols

All key forest users expressed some level of “fear” or lack of trust with conservation or environmental organizations because of forest patrols. Within my study site, there are two types of forest patrols. One NGO, BioCon, employs forest monitors to assess forest changes and community activity. Another organization hires the *Bantay Gubat* (see

Section 5.1) to report illegal forest activities inside the protected area. “Our forest patrols are everywhere—all over these forests,” I’m told by one conservation organizer partly responsible for the patrols. In interviews, another conservation actor referred to this as a “conservation war.”

Organizers cite traps collected and abandoned hunting sites, chainsaws confiscated, and boat hulls found as measures of success of these patrols. Others are wary of *Bantay Gubat* members intruding on upland plantations or interfering with work. All key forest users identified forest patrols as a potential threat to forest management by forest users. Two key forest users identified patrol routes on sketch maps. Two other forest users have transferred agriculture work further into the primary forest to avoid potential conflict with forest patrols. “My strategy now concerns avoiding conflict,” June told me. “In order to make sure I will always have access to trees I just transfer some of my stock (seeds and seedlings) farther into the forest so they will not be identified by patrols.” Another forest user and some of his neighbors have decided to switch from market crops to marijuana to “actively resist” perceived conservation efforts.

A former conservation organizer and long-term resident of the area worried about these changes this way: “The forest guards are not respecting our culture. The methods being used are from the outside. What about being good neighbors within our communities? We have to find a way to have a dialog. All forest management practices aren’t bad.”

There is a history of fear and mistrust with both conservation actors and forest users. All key forest users expressed challenges working with the DENR. Six key forest users cited corrupt relations between local politics, large-scale logging operations, and the DENR.

One forest user group recounted a story of a DENR-based nursery of non-native mahogany and pine (spp. *Pinus insularis*) based in the community of Buruanga. In the early 1990s, part of the site was burned by community members because it changed forest soil conditions and took up community space. “So now, when the DENR and others come and to do survey work here on patrols” I’m told, “we tell them we just use lumber for our own personal use. We really don’t tell them much else or share information.” Similar stories of protest and resistance wove through my interviews. Selective themes are summarized in Table 7 below.

Table 7 - Issues and Outcomes noted by Forest Users Concerning Access and Control of Resources

Theme	Community Issue	Outcomes noted by Forest Users
Land Tenure	Government (DENR) forest plantations	Less land for community projects, non-native species change soil conditions
	Access to appropriate forest type for desired livelihood/forest management strategy	Lack of livelihood opportunities, families seeking off-island work opportunities
Information	Varying levels of involvement in NGO communities	Different members of communities have different levels of access to NGOs; inappropriate technical support in particular communities
	Problems with misunderstanding conservation terms and labels	Challenges with particular terms in meetings (sustainability, harvest, kainghin)
	Misunderstandings of particular NGO goals/conservation strategies	Slow project starts, large investments for communities and NGOs, misunderstanding surrounding particular NGO projects
Markets	Assumptions about forest management techniques	Judgment of forest user land practices by NGOs/outsideers; tension
	Lack of access to seed markets	Resentment; lack of interest in native nursery projects
	The creation of timber markets by non-local actors	Resentment

5.2.4 Conservation Organizations: Dominant Voices

A lack of mutual respect and sharing of information and resources between forest users and conservation organizations was prevalent throughout the area. Forest users were careful to reference specific conservation in their examples when discussing sharing information and knowledge with conservation actors. “It’s not all [conservation] projects that are bad” one key forest user stressed. While attitudes towards conservation organizations were generally negative, six key forest users noted the potential to embrace projects as long as consultations are made or “voices are heard,” one key forest user stated. Others stated that conservation in Northwest Panay “as well as other areas they know of” have a pattern of being dominated by outsiders who “don’t spend much time in communities or understand local ideas and opinions.” During the participant observation phase of my work, I met many forest users who had simply opted out of (formal) conservation activities and initiatives because relations between them are skewed or dominated by outsiders. Seven key forest users discussed feeling powerless, or being, “dominated” by forest mapping, zoning, and boundary creation. Due to their proximity to the forest, several key forest users were involved in the process of defining the park boundaries and identifying forest use zones from satellite images.

Ebon told me, “We were asked to identify different forest plots-- what we used the forest plots for. I felt like we were being judged if we said kainghin. So sometimes we said something different. We felt like we had to give information.” During community meetings discussing the process of park zoning and rules and regulations, forest users mentioned being referred to as “kainghinaros,” a derogatory term that implies judgment.

“We were labeled,” I was told. “Everything we did was bad. How could we say anything different?”

Members of conservation organizations admitted to having mixed relationships with forest users and misconceptions about forest management policies. Opinions concerning the knowledge of key forest users among conservation actors varied. Six conservation actors were certain that the key forest users—the individuals described in my research sample, did not have information that could contribute to forest conservation or opinions relevant to shaping forest policies (pers. comm.). One of the mayors, and a member of the Panay Biodiversity Council commented,” We’ve never just asked the um, kaingheros what they know—or what they think they know.”

Other conservation actors recognized both the tensions and dissonance between themselves and forest users and were open to dialog with a select group of forest users interested in sharing and exchanging knowledge. Table 8 summarizes the views of key forest users concerning their relationship with conservation organizations.

Table 8 - Issues and Outcomes noted by Forest Users Concerning Conservation Organizations

Theme	Concern of Forest Users	Outcomes noted by Forest Users
Fear and Mistrust	Forest Patrols	Weakened alliances between neighbors, mistrust of outsiders, rumors, transfer to other forest lands to avoid conflict
	Government (DENR) forest plantations	Mistrust of non-local management, concerns about corruption in forest management
Conservation “Dominance”	Historic Land Claim	Lack of security,
	Involvement of delineation of park boundary	Problems trusting outsiders, pressures for information
	Being referred to as kainghinaros	Lack of ability to have dialog at meetings

5.3 A Forest of Fiascos: Mismanaged Forests and People

The tensions within the forest and in planning meetings between forest users and conservation organizations resulted in more than the highlighted outcomes noted above. Specific outcomes on the ground also occurred. One such example involves a series of European Union funded native tree nursery projects in NWPP. Although some of the key forest users involved in my study were hired to collect germplasm for the multi-year nursery project; that is where the cooperation between key forest users and conservation actors ended. After the duration of one season, project implementers and hired laborers who managed and maintained the nurseries failed to acknowledge both key forest users categories of forest knowledge and suggestions concerning nursery management. According to key forest users, project nurseries were placed in geographically unsuitable sites with inappropriate geographic, ecological, and tree-species specific parameters. As a result, many of these projects lost support from communities. Also, as forest users noted, these projects often conflicted categories of forest user knowledge: nurseries used

inappropriate soils (GAK), nursery sites did not have proper microclimate for seed germination (FEK), and tree specific microclimate and soil requirements were not employed (TSK).

As a former conservation organizer told me, seeds from these flooded the local, island seed market and competed with non-native, government subsidized seeds creating controversy. Many forest users (not key forest users) interested in planting seeds as a result of increased awareness concerning nurseries planted the non-native, cheaper and more readily available non-native seeds.

The combination of key forest users categories of knowledge being ignored, problems with information sharing, and unequal power dynamics between forest users and conservation actors creates tension on the ground and differences in how forests are managed. One conservation actor described this narrative this way: “We are creating schisms in the community; destroying the moral fiber, culture, actual relationships between neighbors, and yes, even some of the knowledge that [key forest users] people who live near forests have about them (pers comm., Rasto).”

Just prior to the end of my field research, I held a final follow-up interview with the project manager of the Philippine Endemic Species Conservation Project. The project director told me, “You have been witnessing a conservation war; we are in a war between us and your forest users.”

As my plane banked over the patchwork of forests as I was leaving the NWPP, I couldn’t help but wonder if there was a way to build connections between local forest user knowledge and conservation actors on Northwest Panay. The next chapter concludes

with recommendations for redefining competing priorities of key forest users and conservation organizations.

6. CONCLUSIONS AND RECOMMENDATIONS

In the previous two chapters I discuss components of local forest knowledge and obstacles to this knowledge and other concerns being acknowledged and utilized by conservation organizations with management authority for the Northwest Panay Protected Area. Despite the fact that I found important geographic, ecological and tree specific knowledge among key forest users, this knowledge is not being utilized to inform forest conservation management efforts in the region. This is particularly unfortunate given the experience and knowledge forest users possess, particularly regarding the transfer of seeds and wildlings from the forest to nurseries. In their nurseries, key forest users estimated that at least one third of all species of planted native trees survive; in other cases successful germination rates in nurseries were as high as 90 percent (refer to Table 8). While comparing this “success” with other nurseries is somewhat arbitrary, a recent text concerning tree nurseries in the Philippines notes, many native tree nurseries have mortality rates that approach 100 percent (Pollisco, 2005). Thus, a major recommendation that emerges from this research is the potential value of local knowledge in transporting and caring for seeds and wildlings in reforestation and nursery projects.

This chapter is about a way to move forward. Below I review how forests in Northwest Panay are currently managed and offer specific recommendations. These recommendations involve selectively utilizing knowledge of key forest users through a careful process of joint-learning between forest users and all conservation actors. Finally, I conclude with a brief discussion regarding problems with forest management in the Philippines. I propose a strategy to integrate local knowledge into conservation, and

thereby contribute to the national objective of devolving forest management to local levels.

6.1 The case for local knowledge in Northwest Panay

Some forest users in Northwest Panay possess knowledge that is clearly relevant to forest conservation, specifically with regard to the location and ecology of economically important tree species. Information concerning the collection and distribution of seedlings could be useful in reforestation initiatives. Furthermore, some key forest users I worked with, described as key tree-seed experts above, have had at least some success cultivating native tree species.

I acknowledge that the forest users in my study site do not have the same type of local ecological knowledge, let alone its embeddedness in more complex values, beliefs and world views, possessed by integral shifting cultivators such as the Hananoo in nearby Mindoro. In contrast to integral cultivators and other indigenous forest dwellers, they do not have the social institutions and cultural norms to regulate and manage resources for long-term sustainability. Nevertheless, there are forest users who have important information to share and with patience they can be identified. I think also relationships between them and conservation authorities can be developed if the latter recognize a role that the local forest users can potentially play in conservation; such opportunities to improve forest conservation and management are likely to exist in northwest Panay and perhaps elsewhere in the Philippines.

Given the current state of community based forest management in the Philippines, there is a need to better understand how contemporary forest users live, work, use, and in some cases manage forests. What are their interests? What specific forest knowledge do

they possess? What additional information do they need to facilitate sustainable forest use? What information do they have that can be useful to develop sustainable programs that can be supported by local populations; and how might this information be acquired?

6.1.1 Local knowledge, decentralization and participatory conservation

Forest policies in the Philippines and elsewhere often result in tension between local users and external managers. As noted above, this occurs in part because contemporary forestry policies were built upon exceedingly extractive and imposed colonial government policies. Despite recent calls for participation and decentralization, true participation (as discussed in section 2.3.2), local control and decision-making in forest management has not yet occurred in the Philippines.

Admittedly, it takes time for DENR field officers and conservation managers to be re-trained from roles of enforcement and thinking themselves the only experts to sharing responsibility with others and viewing forest management in a broader context (i.e., such as nursery development and small forest livelihood projects). This is further complicated on Panay where conservation actors foster tension. This occurs through them sponsoring “patrols” moving through the forest on the look out for people not following their rules and where local forest users, who are already marginalized and have untenable land tenure, have to avoid them by going deeper into the forest to gather forest products and resources. As noted in the previous chapter, this contributes to a growing divide between forest users and conservation actors. Local forest users who have forest knowledge and interests in forest management are driven further away from sharing their knowledge. Rocheleau (2005) advocates tipping this scale by giving key forest users, as a group,

community-based property rights. She argues that governments could start by recognizing “locally appropriate forms of evidence such as fallow farms, orchards, and gravesites (Rocheleau 2005:411).” Upland agricultural farms with rotational fallows, home gardens, nurseries, seed collection areas and dispersion pathways already exist in northwest Panay. Forest users identified these sites on sketch maps and confirmed their function and use through interviews and participant observation. These should be acknowledged and local forest users given authority to use and improve them.

However, there is limited land tenure security for many upland farmers in the Philippines. The rise of social forestry and associated community-based forestry managed leases designed to grant land access and promote forest health have had limited impact on increasing tenure security. Trends in industrial logging, the marginalization of communities, and problems with participation of local people along the development of the NIPAS (National Integrated Protected Areas Systems) act of 1992 have also resulted in little increased land tenure for communities within and proximate to forests.

6.2 Towards a new decentralization

On paper, forest policy in the Philippines is described as co-managed between local people and conservation organizations. This is not the case on Panay. Forest use in northwest Panay occurs in a contested legal framework. By necessity, forest users and their findings are hidden. What if this was not the case? What if forest users were legally permitted to use the forest and perhaps even to mentor those who do not possess the knowledge to collect seeds or manage home gardens?

Encouraging forest users and conservation authorities to collaborate represents an entirely

different approach to conservation. In the case of northwest Panay, embracing co-management of forests will require work. This will be a slow process of building trust with forest users and conservation actors. As I have learned first-hand, this is a slow process. Below I list two types of recommendations, ideas that can nurture local forest knowledge and ideas that address tensions discussed in the previous chapter.

Some specific recommendations that can have immediate impact on tree and seed nurseries created and maintained by forest users include the following:

- 1.) Abolishing patrols by forest guards.
- 2.) Support of key forest users to mentor forest users who want to learn (i.e. forest migrants).
- 3.) Program to support local, forest users' development and management of native tree nurseries. This program might include a training program so the mortality of species can be monitored by local people.

From the data in Chapter four, it is clear the forest users know something. The eleven key forest users are on to something and these relationships need to be nurtured. While this is an immediate way to begin cultivating and nurturing local knowledge, the tension among forest users and conservation actors needs to be addressed.

6.3 Forest Management Recommendations for Northwest Panay

Regarding recommendations that may address tensions discussed in the previous chapter, there is a great deal of work to be done when it comes to the management of both

conservation organizations and the recognition of forest users. Conservation organizations need to be much clearer about how they work with local people. Groups of forest users can utilize existing peoples' organizations to assist in tasks required for community forest management and to engage in potential collaboration with conservation organizations. There are many ways a process such as this might begin.

Given the particular tensions in NWPP, there are good examples of some of these partnerships. One such example is Green Forum, a Panay-based NGO which has using a collaborative research methodology to build resource maps with communities. After data is gathered by visiting forest communities and observing land use practices, Green Forum builds three dimensional models with communities. These maps are used for planning purposes, discussion of important forest resources. Actually establishing working relations and projects within some of these key forest areas identified by forest users is an important step to both generating important information about forests and building relationships with key forest users. As Peluso (1995) and others note, although this process has political implications, these processes can also generate useful information and build trust and working relations among forest users and conservation actors.

This recommendation also contributes to efforts that catalog forest users' knowledge, terms, and management techniques. This information can serve as building blocks for evaluating and contesting claims concerning forest knowledge, a major theme of my results in the previous chapter.

Another key recommendation involves addressing both channels and structure of communication, especially given a the number of communities and fragmented forests of

NWPP. It is important to establish channels that encourage the flow of information, much like the flow of germplasm in the forest (see Figure 5). Encouraging key forest users to constantly exchange and evaluate this information with their own working knowledge and experience is an important challenge to overcome. Conservation actors need to openly address knowledge gaps by hiring forest users as research partners and engaging them in projects such as rebuilding nurseries. One of the primary NGOs in Northwest Panay, BioConservation Trust for the Philippines, sees itself as primary link between the park and communities. As described in the previous chapter, there was a disconnect between understanding between forest users and conservation organizations. Reconciling this challenge is discussed below.

6.4 Constructive, joint-learning between forest users and conservation actors needs to be established.

I argue that conservation actors should spend more time with key forest users, perhaps improving home gardens or helping fortify weak forest product and upland agricultural markets. Enhancing such market opportunities generates viable income projects for key forest users and satisfies the goals of conservation actors to encourage sustainable livelihoods.

In the Northwest Panay Protected Area, there is a history of using outside expertise to authenticate claims made by communities. Is it possible to find a way to involve local communities in documenting important resource issues? The agendas of outside organizations to monitor and map needs to be redirected to managing livelihood security and community development concerns.

As my research shows, key forest users do not often work alone. Key forest users, in addition to regularly traveling and working throughout the forest, are dependent on others for information, building cooperative labor groups, and regularly visiting particular areas of interest such as seed collection areas or particular habitats to collect forest products. I propose tapping into these key forest user networks to gain more nuanced understandings about resource use patterns and forest users needs. Understanding areas important to forest experts and communities is especially relevant to understanding how to key forest users can be involved in the long term management, use, and conservation of particular areas within areas of the Northwest Panay Protected Area. A strategy such as this takes into account various key forest users different abilities and interest to work with conservation actors. This is an approach that argues for decentralized management of the Northwest Panay Protected Area. An approach such as this is appropriate because it is possible for existing local networks (of forest users, farmer organizations, women's groups, cooperative labor networks) to tie into particular aspects of conservation actors mission and objectives. Said another way, park management can be decentralized by matching park management goals with different, existing networks of forest users. This requires understanding different forest networks, identifying who they are, and determining their needs and goals.

What does conservation have to gain my beginning a partnership with these potentially few key forest users? Partnering with existing, forest-based networks provides a way to begin to develop long-term objectives about forest use and conservation. A hyper-localized strategy, one that allows specific conservation objectives to be pursued in different forest areas, shows some promises for moving forward (see Dressler 2006 et.

al.).

6.5 Numerous Possibilities for Park Management

As of this writing, the management of the park and forest resources in Northwest Panay is not clearly defined. Conservation actors perform patrols while pilot nurseries and conservation projects exist scattered throughout the study site. Conservation organizations are focused on controlling various aspects of forest management and projects rather than conducting participatory management with communities. Upland agriculture associations, forest farmers, and occasional forest product collectors all are familiar with particular aspects of the Protected Area and its buffer zones but little is being done to coordinate efforts.

There are already established institutions that rely on key forest users for information sharing and exchange. These include upland forest associations and informal, cooperative labor groups. Conservation organizations could work with these existing groups and run a pilot project in which dedicated information officers of conservation organizations coordinate and facilitate the sharing of information. These networks are also a good place to start looking for additional key forest users.

Validating the utility of key forest users and the success of the management of particular forest areas is a difficult question; it requires long term support and commitment both from groups of forest users and conservation organizations. These relationships need to be developed and built slowly, over time. One possibility in working with key forest users is training them in research methods. One of the conservation organizations, PESCP, has demonstrated that this is possible with its

numerous research projects conducted within the NWPPA.

6.6 Who gets to manage the forest? To decentralize or centralize?

These recommendations are part of a broader debate on the decentralization of Philippine tropical forests. Elsewhere, especially in Africa, natural resources have been managed in a decentralized manner by local communities in environments with intensive assistance and supervision (Ribot, 2004). Others argue that there is little evidence that decentralization has benefited either forests or people dependent on them (Kaimowitz et al. 1998). In at least one case in the Philippines, the struggles between state and local managers to decentralize forest management has negatively impacted livelihood security of households within a community (Dressler et al., 2006). What happens on Panay remains to be seen. As the newest protected area in the Philippines, my study site is the newest park in the country—at the time of my fieldwork, there was one small park office staffed by a protected area superintendent that I was never able to track down (despite repeated attempts) for an interview. This site is still very much a park on paper. The local, “key” conservation managers are not always easy to locate or get information from. There is no park office or gates. Unlike other Protected Areas in the Philippines, there are few official signs within the forest and, unlike other Philippine parks, there are no designated trails.

A model of management that allows forest users and conservation actors to directly work together would be better than the current state of affairs. Currently, this involves two separate NGOs within the park authorized to conduct forest patrols; one DENR officer travels to a lowland research station to monitor illegal logging infrequently; and the local

Protected Area Management board – consisting primarily of the local conservation organizations described earlier-- meets approximately every four months. These two NGOs have very different objectives and methods for achieving their goals to the point where key forest users often confuse the two organizations, their objectives, and how they may access either of the NGOs.

A mechanism that allows forest users a voice in defining conservation projects and priorities may give both forest users and conservation actors cooperating roles across the protected area.

6.7 Suggestions for Future Research

Because of the highly localized context of forest knowledge, case studies are important to understand different knowledge systems as well as models of decentralized management. Some of my research communities have drastically different histories of forest management, success and struggles, and history with conservation actors. There is numerous research to be done regarding surveying and identifying groups of forest users, specifying types of projects that may be undertaken, and what type of management they think would work best. A key aspect of such studies is identifying “key” forest users. As noted in this research, these individuals are hard to find. More than eleven key forest users may not exist in my study site. However, working closely with key forest users and also the existing networks of forest-based individuals, may provide the crucial link between forest users and conservation actors and strategies. It is my hope that such collaborative processes can be constructed to build collective knowledge which can lead to management strategies that benefit both local key forest users and conservation actors.

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8. APPENDIX

8.1 Appendix 1: Annotated Interview Guide

This guide has two parts: the first part is my interview guide; questions with annotations and notes on methodology are below.

Interview Guide with Comments

What is the place name of this forest area? Do others use this same name?

As a Peace Corps Volunteer, I learned that forest users I worked with—hunters, park guides in training, forest farmers, and others that places were referred to using local names. These place names often have associations with forest stories, histories, and refer to wildlife presence.

How is this different than the surrounding forest areas?

This question was asked because I was trying to differentiate forest areas in my study? If people didn't understand my question I would try to restate the purpose of my study—that I was trying to identify areas of the forest that were “special” or “important” to them.

How would you describe the soil composition?

There are some detailed soil studies in this area which highlight some important ecological differences. I wanted to see if people also identified differences.

Is the canopy structure significant? Vegetation structure?

Likewise there are some scientific vegetation studies which show some key differences. I wanted to know if people also classified the forest in terms of vegetation.

Is there a successional stage to this forest? What are the vegetation types in this forest?

A western term which refers to general forest age. I wanted to know if people classified the forest by age. In my interviews, I used the term forest “age.”

What are some of the key trees in this area? Tell me about the connections of the trees to wildlife. Looking at these key trees you've identified, are there important uses for the bark, sap, or fruits?

In the literature, there has been a lot of references to the use of non-timber forest products (NTFPs) and the use of multiple parts of trees, plants, and even fruits. I asked this question to make sure I wasn't missing any information. There was one danger with

this—lots of people knew what could be utilized—bark or leaves for medicinal purposes, for example. However, my research tried to get out what resources people actually used—not just what was possible. Once my participants understood this the distinction was easy to make during the interview.

What are the human uses for these trees? How do you use the trees which you have identified as significant?

I had to be very careful how I address the term human use. Conservation actors in the area tend to have framed this as a destructive, illegal practice. Research in the Philippines and throughout Southeast Asia has discussed how particular resource practices are harvested in sustainable ways. Often, the “sustainability” of harvesting depends on ecological conditions in forests or even small forest areas.

What is the relationship of these areas to the local water system or rivers?

With this question I had some problems. Watershed management is a concept that has been introduced into the school system as early as third grade elementary school. Many of my informants explained to me that destruction of forests causes flooding while research shows that this is not always the case. To figure out environmental knowledge about river systems and their significance I had to probe a lot on this question. I would always ask—how did you learn? Who told you? Sometimes it was during schooling, other times it was natural observation—or passed down information. If this was the case, I would probe further? When did you learn this and who told you?

What are the wildlife food sources in this area?

Are there wildlife trapping or “attracting” materials in this forest area?

A few people I worked with did not admit to me that they were hunters or once hunted until after a day or two working with them. I asked this question early in the interview to get a sense of their knowledge—I wanted to emphasize this earlier rather than using the actual term hunting.

As I also found, the term hunting, had some multiple meanings to different people I worked with. Often, any terms that I used or participants used we had to carefully define.

Does wildlife pass through this area? Why?

Asking this question was very important. In at least one case, I think it showed important connections between wildlife and forests that have not been well documented by western scientists in this area. This was not the primary goal of my research, but I was very curious about peoples observations over time.

What species are harvested, and when?

Again, I wanted to get a sense of learning—not accusing people of any activities which could be perceived as being illegal. By asking about harvested species I could also get a sense of the general activities in particular forest areas. We would accompany people traveling through the forest as well. It was important for me to get an idea of general forest use activities. Often, during a second visit, I would look back on my interview notes and need a clarification: I tried to be very careful about what people were telling me their activities were versus those of acquaintances, friends, or neighbors.

How does this compare with previous harvesting levels?

This question was asked to get a sense of change in forest areas.

Part of my research involves identifying why you use (or work in) the areas you use. What else is important about these forest areas?

I was always concerned that I was characterizing forest use, knowledge, or management in western terms. As a committee member told me, I needed to think out of the box and about the big picture. What am I missing? Or, what are we not seeing (in this forest area, on this map we've sketched) was always a question I asked with people—especially later in my fieldwork.

In the forest area(s) we visited, what didn't we see? What is different in other seasons? The dry season, for example? What is different in the fruiting season? Have there been mass-fruiting events here?

I asked this question after the above question because I thought it was relevant to give people I worked with chances to express forest phenomenon in their own terms before I attempted to label different forest interactions.

What are the historical uses/activities in this area? Hunting? Swidden agriculture? If applicable, tell me about the people who lived or used this area before?

Often, I would ask people about activities in the areas I worked. I found that simple lists of activities were not enough. There are several methods of upland farming and hunting, for example. Participants' descriptions of their methods—how they hunted, how often, what seeds or plants they harvested—was part of their knowledge. I would probe a lot with this question and on subsequent field visits I would often follow up on this question—sometimes during participant observation.

Could other forest users (loggers, gatherers) use this forest?

I wanted to get a sense of the type of people who were using forest patches.

What other features make this forest unique? Are there particular features which are significant?

I wanted to make sure I hadn't missed anything. When people said no, I would refer to our sketch maps and make sure I understood what all the place names referenced.

Let's talk about your activities in this area. Do you manage it? Are plants collected or altered? Trees?

I really wanted to get a sense of how people worked in different forest areas. Some people listed off different species of trees in areas; others knew areas as old hunting areas. Participants seemed to term their resource use in their current livelihood activities. Since most of my participants engaged in multiple livelihoods which varied with season and opportunity I found that it was very important to probe with this question.

The term management was also problematic. I think most people I talked with perceived it as a term used by western scientists or conservation managers. In my interviews, I used the term "work" or "utilize."

If you don't collect plants or trees, do collect portions of them? Are there areas in this forest—or the surrounding forest—that are good for collecting plants or trees?

This was a very detailed question. During subsequent visits to particular forest areas we would sometimes have to make lists. Discussions regarding this question informed what type of quantitative data I would collect on peoples' seed and planting activities. Also, I think this would have been a very difficult question if people I worked with had not created sketch maps. This guided our discussions as much as this interview guide.

I'm especially curious about seed and wildling collection activities. Can you tell me if you collect either seeds or wildlings? Can you describe where you collect these materials, how you know where to collect them, and what you do with them?

To some people I worked with, this was perceived as a very sensitive question. Participant observation served as a way to check my information and develop trust and rapport to ask this question.

How did you learn this?

Understanding how people know what they know was very important. Was it passed down from a previous generation? Was the knowledge observed over time? Or, did someone just tell them information? This question, combined with basic ethnographic information I collected on my participants helped inform my understanding of this forest system.

What influenced your learning? Where there other development programs or projects in the area that influenced your practices?

Like most of the country, this area is not immune to a host of development projects conducted by local and national organizations under a variety of organizations with very

different agendas. In some cases, past conservation efforts such as tree nursery projects strongly informed my participants thoughts on tree, seed, and wildling management. Early in my interviews, I learned to probe about former development projects. I would ask if other conservation projects informed some of there thoughts. In most cases, informants brought this up themselves when I asked this question.

Out of the forest products/resources we have talked about, what do you sell or trade?
Can you tell me more about how these transactions work?

Understanding the cash and intangible value people placed on forest areas was really important. In discussing this question, one of my goals was to map the movement of forest products—in particular trees, seeds, and wildlings throughout the area. Understanding the cash value and non-cash value was really important. I would frequently probe by asking how particular seeds or trees planted in areas were acquired. This led to some long and rich discussions.

What do you feel the purpose of conservation work is? Do you feel that the use of forest areas you've described is compatible with conservation goals?

This was a real tough question to flesh out. I would begin by asking about general conservation efforts in the area and what people thought of them. I would then ask how they thought their forest use fit within the goals of conservation. This was perhaps my most sensitive question and in many cases people I interviewed were off and running. I found I ran into problems if I used the terms management or sustainable. I usually just defined this question in very simple terms, took notes, and ask people to define some of the terms they were using during a pause in the conversation.

What forest conditions do you worry about?

This was a relatively simple question to help wind down my interview. Regardless of how people answered this question, one of my basic premises was that what people think about forests is valued. I wanted to ask a direct question about this near the end of my interview to make sure I had a good snapshot about how forest areas were changing.

Who owns this area? How has this changed over time?

I wanted to learn how access rights, property, and the protected area actually translates on the ground.

Are there any local rules for access or use of this area? What about hunting or logging? Farming?

Asking about local rules and activities was really important. This helped understand conservation pressures of forest areas and how actual ownership, or perceived ownership differentiated from use.

What about these forest areas have we not discussed? What else about these areas is significant to you?

Again, was I missing anything in my interview?

8.2 Appendix 2: Checklist to Determine Key Forest Users and develop biogeographical sketches

How much time are people spending in the forest? If they have a hut or piyag in the forest, how much time are they spending there? Is there stay seasonal, monthly, weekly, or daily?
Are they located in the ISF (Integrated Social Forest Area), “buffer zone,” or the primary forest?
What is their history of forest use? How long have they been living and working for a portion of their livelihood in the forest?
What activities are conducted in the plot adjacent to their hut, in the surrounding forest, and away from their hut? Is their hut a base for activities in the forest or only planting? What kinds of activities are occurring on the land adjacent to their hut? If they are doing significant planting, are seeds, plants or other resources transferred to and from the forest?
If people “claim” to be hunters, what do they mean by hunting? For example, are they shooting or trapping fruit bats near their house in the barrio or sitio? Or, are they actually using primary forest for their hunting?
If people claim to be “gatherers” are they actually gathering from the forest? Or, are they harvesting, rattan, nito, bamboo, or another NTFP from a cultivated area, former experimental development project, or an area that is not in the forest?
If people claim to be “collectors,” such as charcoal, wood, honey, are they actually working in the forest?
If people claim to be conducting kaingin, is the activity actually occurring in the upland forest? If not, are they conducting other forest use that may include management of upland forest area? If not, is planting occurring adjacent to or near the forest to attract wildlife? Are they using traps?

8.3 Appendix 3: Knowledge Themes and Categories (unsorted list, prior to grouping into themes)

Identification of planting collection areas
Identification of species (plant or animal)
Seed dispersal
Identification of seed collection areas
Identification of specific mother trees
 Knowledge and belief about spirits and mother trees
Fruiting phenology knowledge
Soil types
Microclimate
Seasonal knowledge
Tree/crop management strategies
Experiments

Long term land use areas
Hunting experience or observations about wildlife distribution
Key geographic features
Knowledge of other forest activities and abundance of resources
Understandings of forest change and species composition
Categories of succession and forest types
Ideas about other forms of knowledge, ie. conservation knowledge

8.4 Appendix 4: The influence of folklore and stories on categories of forest knowledge

Key forest users described their belief in folklore as a factor that influenced forest management practices concerning limiting forest product collection activities in particular areas. Five forest users told me stories about particular forest areas that were inhabited by spirits. On maps and in interviews, these forest users identified spirits that lived in mother trees, along particular rivers, and in historic places of human and wildlife significance on sketch maps. Everyone who spoke to me about forest spirits living in mother trees explained that it was wrong to cut these down or ‘disturb’ these trees. Vsing told me, “A ‘white’ lady lives in a Nara mother tree. Years ago, she was courting T.A.. When he went in the forest he would sometimes see her. He still sees her occasionally; this is one reason why this place is special.”

Tye told me, “In the forest, there are also black, invisible people. They can give headaches and stomachs to children—the only people who can see them. Usually we avoid these forest areas; if we need to collect or work in these areas we take care to just take what we need.”

While these stories and beliefs cannot be classified as local knowledge, key forest users added these places on maps. This has implications for both local and regional park managers concerning the preservation of particular areas. Acknowledging particular areas within protected areas is particularly important in the debate whether or not Philippine park management should be decentralized.